

THE LARYNGOSCOPE.

VOL. XXXVII

OCTOBER, 1927.

No. 10

ORIGINAL COMMUNICATIONS.

(Original Communications are received with the understanding
that they are contributed exclusively to THE LARYNGOSCOPE.)

A NEW AID IN THE DIAGNOSIS OF MASTOIDITIS.*

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Inasmuch as bone is composed of over 95 per cent of calcium, it occurred to one of us (I. F.) that an increased calcium content in pus would be an index of bone solution. Accordingly, we have made calcium determinations of pus from sources of manifest bone necrosis, and compared them with the calcium content of pus from non-bone sources. Our results have been striking thus far—as will be seen in the accompanying table.

TYPE OF CASE	No.	Mg. of Calcium per 100 c.c.	
		Average	Pus Range
Abscess of Soft Parts	26	7.7	3 to 13.4
Suppurative Adenitis	2	6.5	3 to 10
Chronic Sinusitis	10	8.8	5 to 12.5
O. M. P. A.	17	9.6	4 to 15
Ac. Mastoiditis with Bone Necrosis	24	33	21 to 58
Osteomyelitis of Long Bones	6	24	18 to 32
Chr. Antritis with Fistula (Tooth)	1	26	
Perforated Frontal Sinusitis	1	20	
*Testicular Abscess	1	18	

*Semen contains over 20 m.gms. of calcium per 100 c.c.

The soft part abscesses include pus from the lung, liver, muscle, joint, glands, cervix, Fallopian tube, appendix and chest.

Our determinations were first made by the Kramer-Tisdall method. At present we are using a method soon to be published by Dr. Theo-

*Read before New York Academy of Medicine, Section on Otology, March 11, 1927.

Editor's Note: This ms. received in The Laryngoscope Office and accepted for publication May 2, 1927.

dore Kuttner, of the Chemical Laboratory of Mt. Sinai Hospital, which is designed for small quantities of pus, 0.1 c.c., the calcium being estimated colorimetrically, using the Kuttner micro-colorimeter. This method is advantageous, for in a mastoid disease larger quantities of pus from the ear canal are difficult to obtain. In collecting the discharge, the ear canal is first cleansed thoroughly, and non-absorbent cotton, the end of which is covered with petrolatum, is placed at the entrance of the canal. This minimizes evaporation.

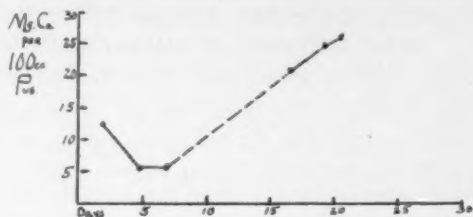
There have been many instances where the calcium content of the pus has aided us materially in indicating surgical interference. The following case is of interest:

A child, age 8 years, was admitted to the Otological Service of Mt. Sinai Hospital, suffering from an acute otitis media. During her first week in the hospital she had a moderate amount of discharge and some fever. There then followed a period of two weeks, during which she had no fever, diminishing discharge, no pain and no tenderness. There was no change in the canal wall. There were evidences of beginning resolution in the tympanum. During the first week the calcium content of the pus fell from 13 to 6 m.gms. per 100 c.c. During the third week it rose to 21, then to 26 m.gms. On the day on which the calcium content was 21 m.gms. the child had a rise of temperature to 102° for the first time in two weeks. Two sets of X-rays during this time showed a haziness, with no evidence of destruction of intercellular septa. She was examined by the pediatricians, with negative findings. At the end of the third week, the status of the child was as follows: There was scant discharge. The drum was flat. The short process and the light reflex were visible. The discharge, however, pulsated, as did the posterior half of the drum. The hearing in the affected ear was poor, in view of the manifestations of resolution in the tympanum. This, together with the unexplained fever, indicated a deep-seated focus in the mastoid. On the morning of the day of operation the calcium content of the pus was 26.6 m.gms. The depth of the mastoid was found to be the seat of extensive purulent bony necrosis. The culture showed hemolytic streptococcus.

Below will be seen the calcium curve in this case.

A number of instances could be cited where the calcium determination has run a close parallel to the clinical and operative findings. It has helped us make decisions in doubtful cases. We have had one case where the calcium content was high, but the clinical picture did

not warrant surgical intervention. The patient recovered spontaneously. Whether he had bony necrosis in the mastoid, or an uncomplicated otitis, is a question we cannot answer.



COMMENT.

1. We hope to stimulate others along the lines laid down above, in order to accumulate voluminous statistical material.

2. We are as yet not ready to operate, or not operate, on chemical data, except as confirmatory of clinical evidence.

3. All the discharge coming from the middle ear, even where a complicating mastoiditis is present, may not come from the mastoid. The infected mucous membrane of the tympanum undoubtedly contributes some. Therefore, several calcium determinations should be made.

4. This test may prove of help to the general surgeon in determining a bone focus.

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INTRODUCTION TO AN ONTOGENETIC AND PHYLOGENETIC STUDY OF THE MASTOID AND MIDDLE EAR.*

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When Von Baer first formulated his law of recapitulation, he actually meant to imply that the individual during his ontogenetic development actually passed through the various stages of completed development of pre-existing and lower species. Since then this concept of recapitulation became modified, and it is now understood that the ontogeny in the higher species repeats only embryonic stages of its antecedent phylogeny. The reason for this change in concept is to be attributed to the advances in comparative anatomy and embryology, by means of which many hitherto accepted homologies have been proven to be analogies only. When one structure of a given species closely resembles another structure of a different species, these structures are said to be analogous. If they prove to be of the same embryonic origin, whether they serve similarly in function and have semblance of form or not, they are homologous. The reason I stress the distinction between analogy and homology will become evident when we come to trace the homologies of the structures that go to make up the middle ear and mastoid process.

No one organ in the human body is so thoroughly made up of transformed elements as is the ear; including canals, endolymphatic duct, maculae, utriculus, sacculus, lagena, tectorial membrane, otoliths, perilymphatic spaces, membranous cochlea, ossicles, annulus, Eustachian tube, tympanic membrane and mastoid process.

Take, for instance, the evolution of the inner ear. From the simplest condition and earliest phase of the cell colony, a group of ectoderm cells are transformed and become sensory cells; and when the homoplastic organ becomes differentiated, it becomes a surface organ. In the heteroplastic organ, the canal complex is complicated and remains independent as the functional ear. The organ lies beneath the surface. It is only after much transformation that the phase is reached where the canal complex acquires anatomical and physiological relations with the middle and outer ear. In short, the inner ear is transformed from the lateral line sense organs by embedding itself

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Editor's Note: This ms. received in The Laryngoscope Office and accepted for publication March 2, 1927.

deeper and differentiating itself into a complex system of canals. The story of the ontogeny and phylogeny of the inner ear is long and complicated and out of the scope of this paper. The above-mentioned facts were merely brought in to illustrate that the ear in its entirety, inner, middle and outer, is the end product of phylogenetic transformation.

What are the transformations that took place to bring about the mammalian middle ear in general and the human in particular? What is the antrum? How did it come about? What is the aditus-adantrum? And, lastly, but not least in importance, what is the phylogenetic origin of the mastoid and what function shall be attributed to it?

In order that the ontogeny and phylogeny of the structures under consideration may be better understood, I will first briefly review the anatomy of the adult temporal bone.

The temporal bone is made up of four components. The squamosal, which is very primitive; the tympanic, which is a jaw element; and the petrous, which in itself is made up of four ossific centres, namely: pro-otic, which ossifies the superior semicircular canals, the vestibule and the inner tympanic wall; the opisthotic, which ossifies the other semicircular canals, cochlea and floor of the tympanic cavity; the pterotic, which forms the tegmen, and the epiotic, which forms the mastoid. The mastoid, then, is a bony accretion on the lateral edge of the petrous pyramid. The mastoid has a lateral and mesial surface and posterior and superior free borders. The lateral surface is rough for the attachment of the sternocleidomastoid, splenius capitis and longissimus capitis muscles. Near its posterior border, almost opposite the external auditory meatus, it has a foramen known as the mastoid foramen, which passes a vein to the lateral sinus, and a small artery to the dura. Anteriorly and mesially there is a groove known as the digastric groove for the attachment of the digastric muscle, and still more mesially there is another groove known as the sub-occipital groove for the passage of the occipital artery. Below, the mastoid terminates in the mastoid tip. The inner surface is continuous with the rest of the petrous pyramid, except posteriorly, on the free surface of which there is a deep sulcus for the passage of the sigmoid portion of the lateral sinus. The posterior border articulates with the occipital bone.

The anterior limit of the mastoid forms the posterior meatal wall. The mastoid, like the rest of the cranial bones, has an inner table and an outer table; but unlike the rest of the cranial bones it has no diploe, but is filled with pneumatic spaces, which are separated by

bony septa. These spaces or mastoid cells lead into an irregular cavity situated in its upper and anterior angle, known as the antrum. From the antrum a small channel known as the *aditus-ad-antri* leads to the tympanic cavity. The tympanic cavity has six walls, an upper, or roof, which is made up of the tegmen; an inner wall, which is the external wall of the labyrinth, a posterior, which is made up of the anterior mastoid limit, and inferior, which consists largely of the roof of the jugular bulb, an anterior contributed largely from the carotid canal, and external, which is the tympanic membrane.

The tympanic cavity is again divided into the tympanum proper, that is, that portion which is directly facing the tympanic membrane and attic or epitympanic recess, that is, that portion above the upper limit of the tympanic membrane, and a hypotympanum, that is, that portion which is below the lower limit of the tympanic membrane.

The inner tympanic wall has the following structures in it. Above is the facial eminence. Below that, posteriorly, is the oval window. and below that, the round window. Separating the oval from the round window is a convex eminence, known as the promontory. The oval window contains the stapes and is attached to it through the annular ligament. Back of the oval window is a recess with a prominence on it known as the pyramid which gives attachment to the stapedeus muscle, the tendon of which runs to become attached to the neck of the stapes. In the anterior wall is the opening of the Eustachian tube, and above that the semicanal of the tensor tympani muscle. Contained within the tympanic cavity are the other two ossicles, namely, the incus and malleus, which stretch from the tympanic membrane to the head of the stapes.

At birth the squama varies little from the adult squama. The tympanic bone is only an annulus and the petrous has its pro-otic episthotic arcuata, which is not formed because a strip of dura still dips into the fossa subarcuata. The epiotic is not formed at all. In other words, there is no mastoid formed. The mastoid begins to form soon after birth and is complete at the age of five. The tympanic cavity is almost of the adult size. The antrum is large and the ossicles are fully formed. The fact that the ossicles are fully formed at this stage harmonizes with the view which will be considered later, that in their ancestral history they were still larger and discharged functions other than that of sound conducting. In short, at birth the middle ear and its contained structures are almost fully the adult size. The mastoid is a flat plate on the surface of which the digastric becomes attached. Under the attachment of the digastric, the facial makes its exit. There is as yet no true stylomastoid foramen and

no styloid process. In passing, I like to mention the fact that the styloid, although it becomes attached to the temporal bone, is not a part of it. For it is a derivative of the second branchial arch. From the age of five months of fetal life, to full term, there is practically no difference in the character of development, but that of size. At three months the squama is fully formed, the tympanic annulus has already made its appearance, but in the petrous none of the centres began to ossify. There is only a cartilaginous ear capsule. The development prior to the third month is merely a phylogenetic repetition in the ontogeny of the individual.

What, then, is the phylogeny of the middle ear?

In none of the fishes is there anything simulating a middle ear. True, in the Silluroids and Clupeidae there is the sinus impar, a space-like approach to the labyrinth, but it is not until the urodele amphibians are reached that a stapedia plate is noticed. In fishes the auditory organ consists merely of the simple cochlea, which is a small, knob-like appendage of the secculus. In the urodeles (tailed amphibians) the footplate of the stapes makes its appearance in the oval window. In some, this plate becomes elongated and by the addition of another element, forms the columella auris. The tympanic cavity, tympanic membrane and Eustachian tube opening into the pharynx are first met with in the anura (tailless amphibians). In birds and reptiles, these structures become more perfectly developed, but no new elements are added until the mammalian stage is reached.

In mammals, the ossicles first appear in place of the columella of birds and reptiles. The malleus corresponds to the articular element of the mandible of lower vertebrates, and the incus to the quadrate. The origin of the stapes as existing in mammals is still controversial, some holding that it is a further development of the columella, while others consider it to be a transformed element from the hyoid arch.

Now, what is this incus-quadrate, malleus-articular transformation? In order that the credulity of the otologist may not be overtaxed, I will briefly sketch the formation of the vertebrate skull and thus indicate the elements already mentioned, as well as others yet to be considered as this paper progresses.

In the early vertebrates the notochord extends for a certain distance to the base of the skull. On either side appear a pair of rods known as the trabeculae cranii. These lie along the base of the brain. Their posterior parts embrace the notochord, and are known as the parachordals. These unite to form the basillar plate, while the slender anterior parts of the trabeculae project forward to enclose a space, the primitive pituitary fossa. The visceral portion of the skull

or the face is formed from the first and second branchial arches. The first or mandibular arch lies in the region of the fifth nerve behind the mouth, and encloses the spiracle which is destined to become the Eustachian tube. The arch is divided into dorsal and ventral halves, known respectively as pterygoquadrate and Meckelian cartilages. The second, or hyoid arch, lies between the spiracle and the first true gill cleft in the region of the seventh nerve. It divides into an upper element, the hyomandibular cartilage, and a ventral portion, the hyoid proper. As the vertebrate scale advances, the mandibular arch undergoes new modifications. The pterygoquadrate half loses its jaw function and becomes more closely connected with the cranium. Its median portion disappears and becomes replaced by the palatine bones. The rest ossifies, anteriorly, into the pterygoid, and posteriorly into the quadrate which acts as the suspensorium of the lower jaw.

The ventral half, or Meckel's cartilage, also gives rise to several elements, and they are as follows: 1. Dentary. 2. Splenial. 3. Angular. 4. Surangular. 5. Coronoid. 6. Goniale. We are now ready to proceed with the homologizing.

The quadrate of reptiles becomes free from the squamosal, and by reduction in size and by change of function is transformed into the incus of mammals.

In the embryos of all mammals the malleus is entirely continuous with the Meckelian cartilage and seems to form its posterior portion just as does the cartilaginous anlage of the articular in reptiles.

The incudomalleolar joint suggests the joint between the quadrate and articular, while the body of the malleus forms the posterior expansion of the Meckelian cartilage.

The processus longus or Folian process of the malleus homologizes with the angular.

The tympanic bone is considered as transformed from the surangular.

The external auditory meatus and the Eustachian tube, which together form the tubotympanic canal, are considered to be the homologues of the first gill cleft. When this canal first appears in the embryo, the meatus is filled with cuticle of ectodermal origin and corresponds to the outer portion of the gill tube. The Eustachian canal opens into the pharynx and, like it, is lined with endoderm. The external meatus and Eustachian tube are separated by a membrane, the tympanic membrane, the supposed homologue of the septum between the inner and outer gill cavities in fishes. The tympanic cavity

in man arises as a dilatation from the tube tympanal canal which grows up from below and surrounds the auditory ossicles.

To recapitulate then, the middle ear as a structural and functioning entity does not exist until elements entirely foreign to the function of audition, or conduction of sound, becomes differentiated and forced an entry to occupy a proximal position to the tubotympanal canal; and the tubotympanal canal in turn enfolded and housed them for the service of sound conduction that they were subjected to from then onward. It is understood that when this took place the necessity for more precise audition was urgent and that better articulation between the squamosal and condyloid of the lower jaw had been established. The quadrate and articular of the old skull jaw articulation becoming useless, dwindled in size and accepted their new fate. The quadrate forced its way through the Glasserian fissure and the malleus projected upward.

How about the antrum? How about the mastoid? What forces in phylogeny can be traced to account for their becoming? True, the antrum is said to be the distal dilatation of the Eustachian tube, and to account for the mastoid, that is, the pneumatic mastoid of man, it is again stated that the antrum is the mother cell. If the antrum is the distal end of the Eustachian tube, and is at the same time the mother cell of the mastoid, it means that the mastoid cells are also diverticulae of the Eustachian tube. Is this really a fact? Again, why the narrowing of the *aditus-adantri*?

Dr. W. Krainz, in a paper published in "Die Ztschr. f. Hals-Nasen-u-Ohrenh.," 1923, claims that he demonstrated, that the mucosa of the mastoid cells and antrum lacks a *tunica propria*. This fact is significant. There being no *tunica propria* to carry the glands, nerves and lymph nodes, its character may not be, therefore, that of a true mucosa. In a later paper, the same author proposed the name "*endosteum pneumaticum*" for the membrane lining the mastoid. According to Dr. Krainz, then, the function of this mucosa has probably something to do with the mastoid pneumatization. This being so, the question arises, why does the pharyngeal tube lining change its character at the antrum, while it persists in the middle ear.

I have already mentioned the fact that because the ossicles at birth, and even before birth, are practically fully grown, the conclusion that in their history the phylogenetic course was from larger structure to smaller structure was legitimate. One other conclusion might have been drawn if other facts did not contradict, and that is that they have no phylogeny at all. That is, that their origin was recent. Such a conclusion I will now dare to draw in relation to the phylogeny of

the pneumatic mastoid of man. The fact that at birth there is practically no mastoid at all is indicative of a lack of racial history for that structure, and the facts seem to bear this out.

The mammalian skull up to *pithecoanthropus* has no pneumatized mastoid communicating with the middle ear. I do not mean that there are no air spaces around the middle ear. On the contrary, I wish to stress the fact that such a structure known as the tympanic bulla is possessed by every species of the mammalian order, but none of them, whether oval, conical or nipple-shaped; whether placed below the auditory meatus or behind or laterally, have in them the characteristic of the human mastoid. The tympanic bulla in the cat, for instance, is developed from the tympanic bone, and appears on the base of the skull. Its cavity is divided into two unequal chambers by a bony septum rising from the floor and reaching almost to the roof. The upper or cranial chamber is the smaller and forms the cat's middle ear. The caudal or mesial chamber of the bulla is larger, but is supposed to have no function. The horse, the dog, the rabbit have similar bullae. From the *pithecoanthropus* skull through the Pildown, Heidelberg Neanderthal to Cro-Magnon, however, there is a gradual increase of the size of the true pneumatic mastoid. Is it not then possible to assume that just as it happened in the early mammalian development that because a necessity for better audition arose, as well as favorable circumstances to insure it, disused elements were re-educated to serve in the new function of sound conduction; equally so, when the anthropoid stage was concluded and the humanoid stage begun, that a still finer appreciation and evaluation of sound became necessary and it was the addition of the mastoid to the auditory apparatus that was to accomplish it.

Is it possible that the entire mammalian order should carry about their middle ears a large hollow cavity for no reason at all? I say for no reason at all, for looking through the literature on the tympanic bulla, most authors just give it bare mention, while others, such as Davidson, add that it is of no interest at all. A glance at the smooth, round, finely-modeled bulla of the cat in communication with the middle ear should suggest that since it does not give rise to any muscle attachments, does not act as a support or protection to any structure, is hollow, and is in communication with the middle ear; that it probably is there to act as a resonator. And I believe that it actually does. Physically, it conforms exactly to a Hemholtz spherical resonator, not specially functioning for the isolation of "partials" from a composite note, but rather being one which has no definite vibration frequency of its own and is therefore capable of responding

to tones of any frequency and to combinations of these or noise. The human mastoid, on the contrary, resembles more a series of Helmholtz spherical resonators, each made to vibrate with a certain frequency and therefore fit to serve for the purpose of isolating "partials" from a composite note, and resonate each separately.

It cannot be stated with definiteness what factors in the new mode of life under which the mammal began to vary, accomplished the feat of bringing the ossicles into the middle ear. Nor can it be definitely stated which circumstances conditioned, shaped and mobilized the mastoid into the service of audition. But a clew, so to speak, may be suggested. Since all mammals do apparently have a resonator about their middle ear, and since the resonator of the mastoid type does not appear until the humanoid skull makes its appearance, I timidly suggest that development of articulate speech might have been a dominant factor in the creation of the mastoid. It is the human voice articulating that played the "generator" for the construction of a complex resonator.

Now, suppose that that was the case, what was the material out of which this was created? What was the *vis a tergo* that pneumatized the mastoid? Here is where my courage is beginning to fail, and yet if this introduction is to reach its conclusion, my speculation, no matter how daring, must out and meet with a critique, just and even severe.

The Silluroids are a family of physiostomous teleosts, that is, bony fishes with open pneumatic ducts. These Silluroids possess a peculiar apparatus consisting of a chain of ossicles which connect the air bladder with the ear. This apparatus is known as the Weberian apparatus. These ossicles are formed from a fusion of the second, third and fourth cervical vertebrae. The ossicles are: the claustron, tripus, interclarium and scaphium. With every inward movement of the spatulate process of the scaphium, the cavity of the atrium sinus imparis is diminished and the contained fluid urged onward. As a result of more fluid being forced into the cavum sinus imparis, the saccus endolymphaticus, which floats freely in it, must be compressed and a current of endolymph urged forward which impinges directly on the macula accoustica sacculi of each side. This happens whenever a change in barometric pressure necessitates a readjustment in the position of the fish.

Weber himself theorized that this ossicular chain had the same function as the Mammalian ossicles, and that the air bladder acted as

a resonator, but Bridge and Haddon in a masterly paper on the Weberian apparatus deny it such function.

In the clupedae no such complex apparatus is found, but the clupedae, too, need communication with their macula accoustica sacculi and therefore in the clupedae the air bladder sends a diverticulum directly into the atrium sinus imparis.

Many other fishes have their air bladder in direct communication with their sinus impar. In some cases, too, their diverticulae become detached and encapsulated in bone. It is therefore possible that the antrum is transformed from the sinus impar and that its mucosa is derived from an air bladder diverticulum.

In conclusion, the writer wishes to state that no one realizes more than he does the incompleteness of the data in this paper, as well as the inutility that speculation affords the modern scientific investigator. He hopes, however, that in the continuation of the study he will be able to bring forward real scientific proof and so convert a mere speculation into a substantial scientific chapter. The writer also begs to acknowledge a great part of the substance of this paper to the following works and authors:

Orders of Mammals, Dr. William K. Gregory; *Die Vergleichende Anatomie der Wurbethiere*, Wiedersheim; *Comparative Anatomy*, Kingsley; *The Vertebrate Skeleton*, Kingsley; *The Weberian Apparatus*, Bridge and Haddon.

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VASOMOTOR RHINITIS; A CLINICAL STUDY.*

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Vasomotor rhinitis is a symptom complex manifested by sneezing, nasal discharge, nasal obstruction and, at times, lachrymation. It occurs more frequently in females than in males. A well developed case will give the following history: It continues throughout the year with periods when the symptoms are milder than at other times. Never are the symptoms entirely absent. When the patient gets out of bed and places the feet on the floor, sneezing begins and continues anywhere from one-half to two hours. This is accompanied by profuse nasal discharge of a thin consistency. Following this the nose becomes obstructed. The symptoms abate during the middle of the day, only to recur during the latter part of the afternoon. Some patients sleep well, while others are disturbed by nasal obstruction.

The nasal tissues during the quiescent period are slightly redder than the normal mucous membrane and more moist. While an attack is in progress, the mucous membrane of the nose is anemic, the normal pink color is hardly discernible, and all the tissues give the impression of being oversaturated with a large quantity of liquid. The nasal passages are narrowed, due to swelling of the mucous membrane and mucus in large quantities is seen to issue from many places.

The etiology of this condition is based upon a number of factors. It is rare for one causal agent to produce the symptoms above enumerated. The establishment of this idea of etiological factors in vasomotor rhinitis is based entirely on the results of treatment of the various abnormal findings uncovered after painstaking examinations.

This condition is akin to the other allergic phenomena, such as hay-fever, eczema, urticaria, asthma and angioneurotic edema, in so far as there undoubtedly exists a fundamental congenital bodily predisposition to such manifestations. In most of the cases other members of the family or antecedents will be found to have or have had either vasomotor rhinitis or related conditions.

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Editor's Note: This ms. received in The Laryngoscope Office and accepted for publication May 5, 1927.

On careful search any of the following abnormalities may be uncovered; Sensitiveness to proteins; sensitiveness to autogenous bacterial suspensions; abnormal blood chemistry figures; abnormalities in the nose; abnormalities in the ductless glands; reduction in hearing capacity, very much akin to otosclerosis.

It is unusual to find that only one condition exists which when remedied produces an abatement of the symptoms. More commonly, two or more abnormal findings are uncovered—one of these is usually the fundamental or underlying factor—the others, the exciting cause. Occasionally no etiological abnormality is found; in this instance relief from symptoms cannot be expected.

Among the allergy the most common finding is a sensitiveness to substances such as feathers, animal hair, horse dandruff and house dust which may contain a great variety of substances. Tobacco, orris root, powdered ipecac and the dust of furs may produce this condition. In relation to this phase of the subject, each patient presents his or her particular problem. In some the industry, in which an individual works, bears a definite relation to the complaint. Hay-fever is not considered in this connection because it is a seasonal allergic reaction however, the combination of pollen and other sensitization has been observed many times. During the hay-fever season, the patients' symptoms are aggravated. The following case history illustrates this point very well.

Mr. David A., age 34 years, has for the past two years been sneezing. The sneezing is preceded by tickling of the nose, and is followed by nasal obstruction. He feels worse during the day than at night, worse out of doors than in the house, worse in the winter than in the summer, except for a few weeks in the fall. He has a pair of badly diseased tonsils. There were no abnormalities in the nasal accessory sinuses or in the septum. The urine was normal. The Wassermann reaction was negative. The blood chemistry figures remained within the range of health. He was not sensitive to bacteria found in his intestinal tract, mouth or upper respiratory tract. He was found very sensitive to horse dandruff and slightly sensitive to ragweed and oat pollen. After a series of injections of horse dandruff extract his perennial symptoms disappeared, but during August and September each year he has mild hay-fever symptoms.

The finding of a distinct allergy associated with a striking abnormality in the blood chemistry figures does occur. What relation one bears to the other is difficult to estimate. The following history will illuminate this subject.

Mr. Victor J., age 35 years, has suffered with sneezing and obstructed nasal breathing for six months. He is constantly under great nervous tension. Mentally and physically he is never idle. He smokes incessantly and eats all varieties of food, especially the more piquant kind, such as ham, bacon, sweetbreads and brain. He occasionally plays with a dog. He was found decidedly sensitive to dog hair. His urine contained a trace of albumin and a few hyaline casts. The specific gravity was 1014. The Wassermann was negative.

Blood chemistry: Nonprotein nitrogen=40 m.gms. per 100 c.c. (normal 25-30). Urea nitrogen=20 m.gms. per 100 c.c. (normal 12-15). Creatinine=2.1 m.gms. per 100 c.c. (normal 1-2.5). Uric acid=5.1 m.gms. per 100 c.c. (normal 1-3). Chlorids=0.76 per cent (normal 0.65 per cent).

The patient was instructed to eat meat only three times a week, and not to partake of food rich in nucleinic acid. Coffee and tea were eliminated from his diet. He promised not to play with his neighbor's dog. His symptoms subsided promptly. Unfortunately, he did not give me the opportunity to determine whether or not the correction of his diet alone would have stopped his symptoms.

That bacterial sensitiveness is a common cause of vasomotor rhinitis is attested by the comparatively large number of beneficial results obtained with autogenous vaccines on those who are sensitive to bacterial suspensions of organisms found in the various tracts in the body where bacteria abound. This variety of cases is susceptible of division into three groups. First, the cases which show an allergy to bacteria isolated from the nose, throat and mouth. Secondly, those which are sensitive to bacteria obtained from the intestinal tract. Thirdly, those cases that react to bacteria isolated from both the intestine and the upper respiratory tract and mouth.

Cases that occur in the first group, namely, those which are sensitive to bacteria isolated from the nose only, are rare. Two such are in my files. There is bacterial sensitiveness without apparent intranasal disease. In both cases no allergy was found to any of the proteins. The blood chemistry was normal. The Wassermann was negative. Both showed a large amount of indican in the urine. In one case the symptoms were ameliorated by cocainization of the nasal ganglion. Both cases received definite and prolonged benefit from autogenous vaccines made from the organisms to which they were found to be sensitive.

Cases that show sensitiveness to bacteria isolated from the intestines are quite common. We have six cases of this variety that

have complete records. The greater the reaction to intracutaneous autogenous suspensions of these organisms within thirty minutes after the test, the more likely it is that a beneficial result will be obtained from vaccines of the germ to which the patient is found sensitive. Quite often delayed reactions occur. It may be slightly positive after one-half hour, whereas in six hours the swelling and redness may be enormous. The significance of delayed reactions is not known. Two organisms are commonly found in the intestinal contents by ordinary cultural methods, namely, *b. coli communis* and *b. fecales alkaligenes*. The latter gives positive reactions less frequently than the former. *B. coli communis* does not give positive reactions in normal individuals. In a number of the cases observed, the normal intestinal bacteria are replaced by a gram-positive coccus. In some, the amount of *b. coli communis* is less than normal. In most of the cases the blood chemistry figures are abnormal. There is in a few cases an associated allergy to foods or inhalation proteins, others have abnormalities in the nose. All of the cases complain of constipation. One case in this group has otosclerosis, besides other abnormalities. This finding will be considered later with one other case of deafness, associated with vasomotor rhinitis.

Three cases had abnormalities in the nose: one, chronic ethmoiditis with polypi; another, degeneration of the middle turbinate; and the last, a marked deviation of the septum. In the case of the first, the symptoms were not so severe after vaccine treatment, diet and high colonic irrigations. The polypi were then removed and she became much improved, although not entirely free from symptoms. The second case showed no improvement whatsoever as the result of general treatment, but the symptoms disappeared after the diseased middle turbinate and subjacent ethmoid cells were removed. The last case will be related in detail.

Miss Bernice J., age 21 years, for the past eight months has had obstructed nasal breathing, sneezing, nasal discharge all day; worse between 3 and 5 o'clock in the morning. Gives a 1+ positive reaction to almond. Is exquisitely sensitive to her own colon bacillus. Wassermann is negative. Blood chemistry shows an increase of uric acid and nonprotein nitrogen, over the high normal figure. She has a marked deviation of the septum. A series of vaccine treatments of autogenous *b. coli communis* was given and the symptoms disappeared. Six months later the symptoms recurred and another series of injections of vaccine was given and she has remained well for over seven years. Apparently her nasal condition had no relation to her symptoms.

Out of the six cases in this group, four have been free from symptoms for from five to seven years, one recent case was markedly improved and one was not benefited.

Why some patients are improved by such autogenous vaccines and others are not helped by the same measure unassisted, is difficult to understand. It is my belief that the intestinal factor is the primary cause in these cases. Diseased states and abnormalities of configuration in the nose by irritation render potential symptoms kinetic. Dragstedt has made the interesting observation that in parathyroidectomized dogs a diet rich in lactose produces a complete suppression of bacterial proteolysis in the intestines and the resultant production of intestinal poisons. He claims that tetany is due to intoxication from these poisons, and the function of the parathyroids is to prevent intoxication from these poisons. Is it not possible that the development of immunity to certain irritative intestinal flora or their products may have the same influence, in view of the fact that the great majority of patients suffering with hyperesthetic rhinitis have a low blood calcium?

Cases that are sensitive to autogenous bacteria isolated from the nose, mouth and intestine are peculiar in so far as the great majority have abnormal blood chemistry figures, have an associated allergy to food or inhalation proteins, and as a rule show satisfactory improvement with treatment.

The following history demonstrates very well this type of case.

Mrs. Florence S., age 43 years, consulted me first on April 10, 1925. For over one year prior to this time had been suffering with severe vasomotor rhinitis. Has itching of the ears. Is constipated. Had eczema as an infant. Mother had eczema. She was found doubtfully sensitive to horse dandruff and sole, and slightly positive to wheat protease. She gave doubtful positive reactions to *b. fecalis alkaligenes* and *b. coli communis* after thirty minutes. Six hours later, the *b. fecalis alkaligenes* reaction became very severe and the *b. coli communis*, severe. *Staphylococcus albus* from the nose gave an immediate severe positive reaction after thirty minutes, and disappeared in six hours. The Wassermann reaction was negative. The urine contained a faint trace of albumin and an occasional hyaline cast. The blood chemistry figures were as follows: Sugar=96 m.gms. per 100 c.c. (normal 60-120). Urea nitrogen= 16.4 m.gms. per 100 c.c. (normal 12-15). Total nonprotein nitrogen=3.3 per cent (normal 3 per cent). Creatinine=1.8 m.gms. per 100 c.c. (normal 1-2.5). Uric acid=5 m.gms. per 100 c.c. (normal 1-3). Calcium=5.6 m.gms. per 100 c.c. (normal 8-10).

She was placed on a diet rich in calcium and poor in nucleinic acid. Once weekly she received a high colonic irrigation. A vaccine containing the three organisms indicated was given twice weekly. She was also exposed to artificial sunlight, twice each week.

Under this regime she immediately improved and continued to be practically free from symptoms until the latter part of August, 1925, when it was found that she had a carcinoma of the right ovary and died shortly after the operation for this condition.

Novak and Hollender have found that the calcium content of the blood was unusually low in vasomotor rhinitis. In some, the basal metabolism was low. Brown and Hunter have more or less confirmed this finding. Sonnenschein and Pearlman found normal calcium and basal metabolism in such cases. As the result of this difference in the findings a controversy has arisen. Strange as it may seem, the opposing camps have used the same therapeutic measures with good results. They treated their cases with calcium lactate, small doses of thyroid extract and quartz lamp. Although the calcium content of the blood was not estimated in all of my cases, in every instance in which it was done, a low calcium figure was obtained. The basal metabolism was not evaluated. Brown and Hunter claim that by this method of treatment they were able to produce a fixation of calcium in the tissues.

What is of greater interest is the finding of an association of deafness, what is generally diagnosed as otosclerosis, with vasomotor rhinitis. In the small number of cases observed the blood calcium has been low and the uric acid high. These findings coincide with those uncovered in cases of otosclerosis unassociated with vasomotor rhinitis and leads one to speculate that both diseases may have a common etiology. Two cases that had the combination of otosclerosis and vasomotor rhinitis were given treatment directed toward the latter and after a time both patients claimed that some of the symptoms relative to their ears had become less and the deafness had not progressed. However, these cases have not been observed for a long enough time for one to come to any conclusions. This matter is entered here purely as an observation. The idea opens a field of research which may throw a further light upon the etiology and treatment of vasomotor rhinitis and otosclerosis as well.

SUMMARY.

Vasomotor rhinitis or hyperesthetic rhinitis may be classified into the nontoxic and the toxic.

The nontoxic is the type that is dependent upon allergy alone. This allergy is in most cases due to a sensitiveness to air-born protein substances.

The toxic type is that form that is more or less dependent upon bacterial sensitiveness, particularly from flora in the intestinal tract. This form is usually associated with abnormalities in blood chemistry, essentially a high uric acid and low calcium content.

If patients are examined in a systematic manner, usually some abnormality is found and most of the cases can be relieved of their symptoms when time and opportunity is given to the investigator.

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FRACTURE OF THE SKULL, FOLLOWING A RADICAL MASTOIDECTOMY SIMULATING BRAIN ABSCESS.*

DR. HERMAN F. LAMPE, New York City.

History: A girl, age 16 years, born in Russia, whose family history was negative and past history unimportant, had a chronic purulent otitis media on the right side, existing from early childhood. Hearing was practically gone in this ear, while the labyrinth was active. Local treatment was given for about a year on Dr. Saunder's Service at the New York Eye and Ear Infirmary. However, there was no improvement in the ear condition and on April 29, a radical mastoidectomy was performed. The mastoid was sclerotic and the middle ear contained pus and granulations, with caries of the ossicles. The sinus was far forward and exposed unintentionally. Dura was exposed by disease in the tegmen antri. The process of healing was rapid and almost complete dermatization had taken place when, on June 1, the patient was again admitted to the hospital in a semi-

*Read before New York Academy of Medicine, Section on Otolaryngology, Feb. 11, 1927.

comatose state, with no history available. Members of her family stated that they could give no information regarding her present condition except that they thought it was a result of the mastoid operation. At times she would rally slightly and, becoming more coherent, raise her hand to the right side of her head and complain of severe pain. During the day of her admission she vomited three times, the vomiting being of the projectile type.

Physical Examination: The patient was semicomatose, muttering more or less incoherently and complaining of severe headache. Her pulse varied between 60 and 65, her temperature was 99° and respirations were normal. The radical cavity was completely dermatized except for a small area around the Eustachian tube. There was no swelling or edema over the mastoid or about the auricle. The eye examination showed the right pupil to be dilated and that it reacted sluggishly to light. There was slight prominence of the eyeball and an external strabismus present. The fundus was negative. The left eye was normal. A lumbar puncture showed the spinal fluid under great pressure, with a slight turgidity, and the laboratory findings showed globulin negative, Fehling's positive, pleocytosis none, and cultivation negative at 72 hours. Blood cultivation was negative at 72 hours. The blood count on the day of admission showed white cells, 10,000; small lymphocytes, 17 per cent; large lymphocytes, 5 per cent; polymorphonuclear, 65 per cent, and eosinophils, 1 per cent.

Treatment and Course: The day following admission the condition of the patient remained unchanged and with a doubtful diagnosis of temporosphenoidal abscess she was taken to the operating room for an exploratory operation. The former mastoid incision was reopened and continued upward and forward over the auricle. After a good portion of the squama was exposed it was found to be fragmented; the loose fragments were easily removed with forceps. Underneath, a large dark mass was observed. This, on closer examination, proved to be an extradural blood clot approximately three-fourths of an inch thick. This extended quite a distance forward and up to about the suture of the parietal and temporal bones. It was necessary to remove most of the squama in order to get rid of the clot. No free bleeding was encountered. The wound was packed with iodoform gauze, the incision left wide open and a sterile dressing applied.

The anesthetist at this time reported that the pupil of the right eye was equal with that of the left and that he did not notice any external diverging. The eye condition was described by Dr. McDaniel as a paresis of the third nerve, caused by the pressure of the blood clot.

Not long after the patient had returned from the operating room and had recovered from the effects of the ether, she stated that she had no headache and only noticed a slight soreness around the mastoid. She then gave a clear history of an accident which had occurred the night before her admission to the hospital, in which she had been knocked down by a bicycle and had struck her head against the curb stone. After this she did not remember anything until the present time.

The patient got along fairly well until June 9th, when she complained of more headache. An X-ray was taken then by Dr. Dixon to see if any of the fragments remained. The report was as follows: A large shadow above and forward of the mastoid operative field, which seemed to indicate removal of the posterior part of the squama. There was no indication of fracture except at the upper posterior angle of this shadow, which passed backward and slightly upward. It was exceedingly indistinct. No fragments were present.

On June 12, very suddenly, a profuse hemorrhage occurred and a large amount of blood was lost through the posterior wound and the meatus. The house surgeon controlled this with pressure. The following day, after a complete dressing, there was no bleeding. The temperature rose to $104.8-10^{\circ}$. The laboratory tests were again performed, but all were found negative. The temperature gradually returned to 100° on June 16 and remained at that until June 24, when another severe hemorrhage occurred. This also was controlled with pressure. The following day the temperature rose to $104.6-10^{\circ}$ and the patient was again taken to the operating room. The wound was opened under general anesthesia and the posterior branch of the middle meningeal artery was found to be bleeding freely. A small silk suture was placed beneath this and the bleeding checked.

The patient seemed very weak for the following few days but responded well to a blood transfusion and gradually regained her strength. She continued to improve and was discharged from the hospital on July 15, her temperature having been normal for the preceding twelve days. The posterior wound closed without being sutured and the radical cavity healed quickly. At the present time it is completely dermatized and the patient is in excellent health.

55 West 55th Street.

GRADENIGO'S SYNDROME WITH REPORT OF CASE.*

DR. W. LIKELY SIMPSON, Memphis.

In 1904 and again in 1907 Gradenigo described a triad of symptoms which has since then borne his name. These symptoms are acute otitis media, with or without external suppuration; temporal and parietal pain, and paralysis or paresis of the sixth nerve.

Gradenigo divides his cases into three groups: 1. The typical cases, as described above. 2. Those cases having the typical triad of symptoms, but also having involvement at time of the second, third and fourth nerve. 3. Severe cases in which after presenting the typical syndrome, later develop meningitis.

Gradenigo draws the conclusion after a study of his cases that "the triad of clinical symptoms is caused by a circumscribed simple serous leptomeningitis, localized at the tip of pyramid and caused by diffusion of the infection in the tympanum." He states, "The constancy of the clinical picture makes me believe that the propagation was along the pre-existing anatomical paths."

Herbert Vogel in writing on the symptoms complex states that he finds many conflicting opinions in regard to the etiology in the papers of the Gradenigo. Vogel says that Gradenigo in dividing his cases into three groups, as described above, does not present the picture of a symptom complex, and again Vogel states that if the condition originates in the disease at the tip of the petrous that it would be necessary to attack the pathology at the tip, which operation would be very dangerous to life and hearing.

The paths of infection may be almost any number, but those described by Perkins are:

1. The infection may follow the sublabrynthine route, extending from the tympanum below the labyrinth and internal auditory meatus to the petrous tip.

2. From the mastoid antrum it may extend through the subarcuate fossa or petromastoid canal, which passes inward beneath the superior semicircular canal, and reach a layer of cells sometimes lying above the internal auditory meatus, and thus arriving at the petrous tip.

3. Or this point may be arrived at by way of the carotid canal, access to which is obtained either by eroding the bone on tympanic

*Read before the Southern Section of the American Laryngological, Rhinological Society, Jacksonville, Fla., 1925.

Editor's Note: This ms. received in The Laryngoscope Office and accepted for publication March 15, 1927.

foramina which give passage to the carotid branches of the tympanic plexus.

4. Finally the infection has been found in some autopsies to be through a layer of cells extending along the Eustachian tube, thus passing from the tympanum to the petrous tip.

It seems to me that infection may take place through the blood or lymph stream as suggested by Dupuy, but this would be very unusual.

Perkins and MacKenzie have cited the superior petrosal sinuses as a possible route of infection.

The fact that the sixth nerve has such a long, exposed, isolated course, and due to the fact that it traverses Dorello's canal accounts for its vulnerability.

Wheeler, Vail, Perkins and Dupuy all give very interesting descriptions of the applied anatomy.

Vail says: "The deepest-lying bundles of the tentorium can be demonstrated in separate layers which form the ligamentum petrosphenoidale. This ligament passes from the spina sphenoidalis, on the upper margin of the petrous bone, and is inserted into the outer lip and the posterior surface of the lamilla quadrangularis of the sphenoid, somewhat below the posterior clinoid process at the site of the accessory posterior clinoid process, which becomes the bony origin of the ligamentum petrosphenoidale.

Between the inner part of the upper portion of the petrous bone under the outer margin of the lamina quadrangularis of the sphenoid and the ligamentum petrosphenoidale there is a small, approximately three-sided space with the apex outwards and with the base directed inwards. In this space, Dorello's canal, lie the abducent nerve and the inferior petrosal sinus, where it empties into the cavernous sinus. The abducent nerve lies on the lower boundary of this area, more often near its outer angle, often confined to the angle which the spina sphenoidale makes with the upper margin of the pyramid of the petrous bone, which at this point is somewhat flattened from above."

The edema or swelling in this canal or near it would, of course, cause a paresis or paralysis of the sixth nerve.

The pain is supposed to be due to the disease of the cells at the apex or near this, causing pathology, therefore causing interference with the Gasserian ganglion, which is located on the anterior surface of the apex of the pyramid.

It seems to me that the neglected mastoids in which pneumatization is very extensive, there being direct extension of cells to the tip

or almost to the tip of the petrous, are the cases which would be most likely to have the triad of symptoms. Cases of late spontaneous rupture of the drum come under this heading. The streptococcus mucosus has been found more often than other bacteria.

In some of the cases there may be very little, if any, mastoiditis or middle ear infection, but in studying the reports of cases and my own cases I have been struck with the fact that there is usually quite a definite mastoiditis of a severe type, and also in quite a good percentage of cases that after the mastoid operation the mastoid wound may heal quickly, but that there is still profuse discharge through the external auditory meatus.

As to treatment, it seems to me there should be little, if any, diversity of opinion. It seems to me that an early mastoid operation is indicated. Probably this operation should be a little more thorough in hunting for infection, such as in the zygomatic cells, et cetera.

If there is any indication at all for uncovering the dura this probably should be done.

It has been mentioned that the simple mastoid could not possibly give sufficient drainage for the pathology of the tip of the petrous. This must be so in some cases, but usually this is the best procedure. Goris and Streit have described a procedure whereby they removed the diseased parts even at the tip of the petrous portion.

No treatment is necessary for the paralysis. Nearly all paralysis disappear in from a few days to a few weeks.

Abscess of the pharynx burrowing downward from the petrous tip should be opened in the pharynx.

Brain abscess, meningitis, et cetera, are treated as in any other case of mastoiditis.

CASE REPORTS.

Case 1: Miss V. F., age 19 years, admitted to the hospital with acute suppurative otitis media of several weeks' duration. There was a history of severe pain in temple, face and mastoid. The discharge from the ear was very profuse. For six weeks there was a history of double vision when looking to the right, and pain in the right eye.

At the time of admittance to the hospital there was a profuse yellow discharge from the right ear, tenderness of the mastoid and paralysis of the right external rectus. The pupil was dilated and did not react to light or accommodation. The vision in the right eye was 20/30 and ophthalmoscopic findings were negative.

The mastoid operation was advised and done on the second day in the hospital. There was extensive bone disease and the mastoid was of the pneumatic type. The zygomatic cells were diseased and were thoroughly exenterated.

The ear healed slowly after the operation and the discharge continued so profusely and granulations formed in the perforation in the drum, and the hearing being so poor that in about two months it was thought best to do the radical mastoid operation, which was done. After the radical mastoid operation a paresis of the seventh nerve came on but soon disappeared, as well as the paralysis of the sixth nerve.

Case 2: Mrs. A. C. P., age 32 years, is a case of Dr. Anthony's, of Memphis, who was so kind as to allow me to mention her. The case was also a neglected case, coming to Dr. Anthony with a history of having had measles four months previously, with an abscessed left ear, which has continued to discharge almost continuously since. There was severe pain in the head and ear practically all of the time.

When first seen there was a profuse discharge from the right ear, tenderness of the right mastoid and pain in right side of head, temple, and paralysis of the right external rectus. The X-ray showed marked cloudiness of the right mastoid.

The mastoid operation was done. There was extensive bone disease.

The patient made an uneventful recovery. The external rectus paralysis disappeared in three weeks.

Case 3: Miss R. K., age 8 years, came under my care at the Methodist Hospital on Nov. 26, 1924, with acute suppurative otitis media of the right ear, from which she had been suffering for about four weeks. There had been a spontaneous rupture of the drum. The discharge had been very profuse and there had been very severe pain in the whole right side of the head and right eye. A few days before coming to the hospital she had noticed pain in eyes and double vision.

When I first saw the patient on Nov. 26, 1924, she had profuse purulent discharge from the right ear, with a large perforation in the drum, and some granulations in the perforation. There was tenderness of the mastoid, paralysis of the right external rectus with a normal ophthalmoscopic finding. The X-ray showed a cloudy right mastoid.

Especially on account of the paralysis of the external rectus the mastoid was advised to be opened at the earliest time possible.

The simple mastoid was done the same day as admitted to the hospital. The mastoid was of the pneumatic type, without a rupture of the cortex, but considerable pus in the cells and antrum, as well as extensive bone destruction. There was no perforation of the inner plate to be seen, and no unusual extension into the petrous portion of the temporal to be made out.

The wound was left rather widely open, being packed with iodoform gauze.

For the next few days there was nothing unusual except that there was very little discharge from the mastoid wound, while there was still a profuse purulent discharge from the middle ear.

The little patient did so well that she was sent back to the hotel on Dec. 7, 1924, but on the next day the patient had temperature 103°, vomited, etc., and was returned to the hospital.

Dec. 9: Neck slightly stiff; Drs. Rosamond and Bunting did a lumbar puncture. The spinal fluid was slightly cloudy; 2,000 c.m.m. culture of this fluid did not show any bacterial growth. The temperature at this time was 103.8° but after the lumbar puncture all meningeal symptoms disappeared, as well as the temperature going to practically normal for several days.

About two weeks after the first lumbar puncture the patient again developed symptoms of general meningitis. A lumbar puncture was again made, which showed 2,000 cells per c.m.m. and later showed the streptococcus hemolyticus. The little patient gradually grew worse and died Dec. 30, nearly two months after the onset of the disease. No autopsy was made. During the last three or four days before death, at intervals of a few hours, a thin watery discharge came from the affected ear. This fluid had the appearance of a cerebrospinal fluid. This flow of fluid continued from a few minutes to a few hours each time. The paralysis of the external rectus continued all through the disease.

Case 4: Miss L. D., age 22 years, came under the care of Dr. Frazier and myself at the Baptist Hospital on Dec. 3, 1924, with the following history: Had an abscessed ear a few years ago; had a septum operation, Nov. 22, 1924, and after this operation went along nicely and went back to work, but very soon felt badly and developed a cold in the nose, and on Nov. 25 had a chill, and had an earache and some sinus trouble. Twenty-four hours ago had right ear opened, and today had left ear opened. Has had some swelling and tenderness of right frontal region two or three days.

The findings at my first visit were as follows: purulent discharge from both sides of the nose, with swelling of all the turbinates,

marked swelling and tenderness of right frontal region, purulent discharge from both ears, and the throat was very red and dry. Temperature 104° and patient rational. The X-ray showed a pansinusitis, both sides, and cloudiness of both mastoids.

Ice bags were applied to the right frontal, and suction, cocain and adrenalin to the nose. There was a slight drop in the temperature the next three days and all the swelling from the right frontal disappeared, but on Dec. 8 the patient developed the following symptoms: stupor, paralysis of the right external rectus, and swelling of both nerve heads, and paralysis of the left arm and left leg.

At this time there was still much pus from the nose and ears, but the ears did not have the appearance of a severe type of mastoiditis, while the nose seemed to be of a more severe type, and especially as the right frontal region had been swollen and tender, it was thought best to explore the right frontal region, which was done Dec. 8.

The findings at the operation were as follows: The usual incision through the unshaved brow and well down on the nose was made. An injection of novocain and adrenalin in the line of the incision just as the ether was started. The right frontal was very large and filled with pus. The sinuses were cleaned out and the entire floor removed and a large opening made into the nose by removing the major parts of the ethmoids. The posterior wall of the frontal could not be examined as carefully as desired through the brow incision and as the condition of the patient was so critical it was thought best to take off the entire anterior wall of the sinus, which was done by extending the incision in the soft parts upward in the median line.

The posterior bony wall of the frontal was normal except for almost complete absence of mucous membrane lining. No perforations were to be made out. Drainage tubes were placed into nose and also two tubes externally.

The mastoid were not disturbed, as it seemed as though the frontal pathology accounted for the symptoms.

The patient gradually improved, regaining consciousness and use of the left arm and leg, but at this time very little improvement of the right external rectus has been made. There is still some swelling of the nerve heads. The ears have both become dry and the hearing is nearly normal.

It seems to me that it is very difficult to say definitely whether the paralysis of the external rectus was due to the frontal sinus infection or to the middle ear infection. If there had been no frontal sinus

infection one would have called this case typical of the Gradenigo type.

The first two cases come under Gradenigo's first group with the simple triad of symptoms.

The third case comes under the third group, which cases present the triad of symptoms and later develop meningitis.

The fourth case, if properly coming under the Gradenigo symptom complex, comes under the first group, with a coincident frontal sinus infection, with its associated complications.

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POSTOPERATIVE RADIUM TREATMENT OF NASAL POLYPI.*

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The cause of nasal polypoid formation has not been accurately determined and its treatment, either by surgery or palliative methods, has always been far from satisfactory. While it is accepted generally by rhinologists that polypi owe their existence to irritative phenomena the exact importance of irritation as a factor in their production is undecided and the marked variation in the opinions of those who are conceded to know most about it serves to emphasize the haziness of their etiologic conceptions.

This uncertainty as to origin necessarily finds a reflection in the diverse forms of treatment which have been advocated and employed. Lyons, for example, states very positively that nasal polypi are due to inflammation produced by vasomotor changes or suppurative conditions, and that this has a direct bearing on the treatment, "in that simply removing the polyp will not affect the underlying inflammatory process which must be eradicated."

McCullagh and Robinson, writing four years later, reach the same deduction by an entirely different route. They are of the opinion that the weight of evidence indicates that irritation merely acts as an excitant—unless the subject has a predisposition toward new growth formation, no amount of nasal irritation will be able to produce polypi. In their experience polypoid formation seldom develops in nasal disease that is frankly purulent from the start, but "an acute infection may often be grafted on a mild, slowly progressive type of this disease, causing a very rapid florescence."

After a very careful study of this vexed question of etiology, Freedman reached the conclusion that the nasal polyp is not a new growth at all, but rather a localized edema and prolapse of the normal mucous membrane of the nose, which may result from either infection or trauma. If not due to operative trauma, a fully matured polyp is always a symptom of bone involvement of one or more of the accessory sinuses of the nose. In the final analysis he considers the nasal polyp to be "only a symptom of an underlying osteomyelitis, or, at least, a periostitis of one of the sinuses", and points out that

*From the Otolaryngological Department, Beth Israel Hospital.

Editor's Note: This ms. received in The Laryngoscope Office and accepted for publication July 30, 1927.

mere removal of the exuberance without attention to the underlying condition will never effect a cure.

All the authors quoted, however, unite in asserting that the therapeutic methods hitherto employed have been highly unsatisfactory and that anything which promises any degree of improvement in the results will be welcomed warmly. In 1921, Lyons, of the Mayo Clinic, reported that the use of radium following the surgical removal of polypoid masses did not abolish the tendency to recurrence, but changed the character of the growth from myxomatous to fibrous, rendering its surgical handling much easier and eventually seeming to check its reappearance. It was found that "the more nearly a polyp pathologically simulates the fibroma, the more easily a complete cure is effected by removal".

The following year the same worker published a report of 55 cases of nasal polypi in which radium had been used postoperatively. While it was not possible to draw any definite conclusions—owing to the small number of cases and the brief time which had elapsed since the treatment was applied, it was found that radium did lengthen the intervals of recurrence in the majority of cases, and that operative cure occurred more frequently with radium than without it.

About one year later Sluder published a statement to the effect that he had applied 12.5 m.g. of radium in gold tubes "into or amongst the polyps" and though none of his cases could be termed "cured" at the time he was writing, "radium had apparently stopped the tendency of the polyp to reform".

The latest publication on this subject is that of McCullagh and Robinson which appeared last September. These writers have given an initial radium exposure "within a week after radical operation and a day or two after removal of recurrences". They found that recurrence took place regularly after the first irradiation, but their experience coincided with that of Sluder and Lyons, in that the intervals between recurrences became more extended and the character of the polyp changed. Though they feel that "the question of definite cure must wait on wider experience and longer elapsed time in patients apparently cured", they are yet convinced that "radium is the most effective agent yet found for the control of this condition".

As a contribution towards the elucidation of this question, and as a record of the results of practical application of this therapy, I submit a series of cases, with a resume of results obtained in the postoperative use of radium in nasal polypi. During a three-year period we have treated 65 patients, but in order to keep the report reasonably short, only six typical examples will be given.

Case 1: L. S., male, age 53 years. During the past twelve years there have been several attacks of sinusitis, with intense headache and inability to breathe through the left nostril. Examination showed a very large polyp, which practically filled the left nasal cavity, so that it could be seen through the anterior naris. X-ray of the accessory sinuses gave no positive results, although on illumination they appeared cloudy, owing to thickening of the mucous membrane. A small section of this polyp, removed for pathological examination, was reported as consisting of chronic inflammatory tissue. No pus was present in either nostril. When removed, the origin of the polyp was found to be in the ethmoid, and on Feb. 4, 1924, a needle containing 50 m.g. of radium element was inserted in the ethmoid region at the point of attachment of the polyp, giving an exposure of two-and-a-half hours. This application was repeated on Feb. 14 and 28. Four weeks later examination showed the mucous membrane to be normal in appearance, and the base of the polyp in the anterior ethmoid cells to be visible. This patient has since been examined at six-month intervals, and up to the present there has been no recurrence.

Case 2: M. M., male, age 35 years. Complaint of nasal obstruction for several years especially marked during the past six months. Examination showed both nares completely obstructed by polypi originating from the diseased mucous membrane of the ethmoids. These were easily removed with the nasal snare. On Feb. 28, 1924, 35 m.g. of radium, screened by brass and rubber, were inserted high up in the right nasal fossa at the ethmoid area and kept there for three hours. Three such treatments were given at two-week intervals. A slight reaction followed each application. The patient was kept under observation for a year after the last radium treatment, and during that time there was no evidence of recurrence. He failed to return for further observation.

Case 3: J. M., female, age 30 years. Has had some difficulty in breathing for the past five years. Some polypi were removed from the right nostril two years previous. Examination showed several long polypi suspended in the right nasal fossa, apparently originating from the posterior end of the middle turbinate bone. A small sized solitary polyp was perceived high up, its base being probably at the cribriform plate of the ethmoid. Nothing was gained from X-ray examination of the accessory sinuses. The polypi were easily removed with the snare, after which 35 m.g. of screened radium were applied for three hours to their bases. In all, three such treatments were administered. This case was under observation for two years, and during this time there was no trace of any return of the polypi.

Case 4: J. T., male, age 48 years, barber by occupation. Complaints of complete nasal obstruction, especially marked for the past three months. There is a history of operation for removal of several polypi two years previous. Examination showed both nostrils filled with mucoid-appearing polypi, with pus present on each side. X-ray of the accessory sinuses showed a clouding of the right frontal sinus, and of the antra and ethmoids on both sides. On Jan. 12, 1925, the right antrum was punctured and found normal, and at the same time the ethmoid cells were exenterated and all the polypi removed. On Jan. 26, the left ethmoid was similarly treated. March 26, 50 m.g. of radium element, screened with brass and rubber, were inserted in each nostril for a period of two-and-a-half hours. A moderate reaction followed this first application. Three such treatments were given, and during eighteen months which have since elapsed there has been no recurrence. The patient is still being kept under observation.

Case 5: C. B., female, age 39 years. Complaint of nasal obstruction accompanied by severe frontal headache; history of several operations upon the nose, the last being for the removal of polypi. When examined both nostrils were found to be filled with polypi, apparently originating in the ethmoids. X-ray showed cloudy antra and ethmoids on both sides, but puncture of the maxillary sinuses gave a negative result. March 1, 1924, the polypi were removed from the left nostril and the remaining ethmoid cells exenterated. Two days later the same procedure was carried out on the right side. March 15, 35 m.g. of radium element were applied for two hours in the left ethmoid region, and three days later the same application was made on the right. This was repeated in ten days, the patient suffering a slight reaction, and complaining that her nose felt as if it had been "electrified". For the two years we have had this patient under observation there has been no sign of recurrence, but we are still making examinations at intervals.

Case 6: M. G., male, age 35 years. Complaint of severe left frontal headache and obstruction of left nostril. Examination made May 1 showed the left nostril entirely filled with polypi, and the X-ray indicated clouding of the left frontal and right maxillary sinuses. May 2, the polypi were removed and the left ethmoid cells exenterated. Two weeks later, 25 m.g. of screened radium were placed in the ethmoid region for a period of two-and-a-half hours. This patient is still under observation, and up to the present there has been no return of the polypoid condition.

COMMENT.

Heretofore the cure of nasal polypi has been one of the most difficult problems which confront the rhinologist, and the most enthusiastic worker sooner or later becomes discouraged when the condition recurs repeatedly. Most of the patients have undergone operations for removal of these polypi time after time and therefore eagerly welcome a painless procedure which holds out some hope of relief. While the number of cases treated and the time elapsed since the applications are not yet sufficient to permit us to put forward a definite recommendation of this treatment, we cannot but feel that the results so far obtained at least warrant further and much more extended application of this therapy.

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PATHOLOGICAL CURRENTS AND OTOSCLEROSIS.*

DR. HIRAM BYRD, Bradenton, Fla.

A definite diagnosis of otosclerosis in its earlier stages is impossible, for the reason that at that time the characteristic pathological changes have not supervened. However, preceding these characteristic pathological changes, there are two symptoms, more or less associated, which we are brought to believe are the early stages of that disease. The two symptoms are: 1. Tinnitus, of varying degree of intensity, of pitch, of regularity and of persistence; and, 2. progressively blunting hearing.

In the presence of these two symptoms, and of these only, one is justified in assuming the onset of otosclerosis; and proceeding according to that interpretation.

The essential cause of otosclerosis has never been determined. So it is permissible to theorize when one has a clear field. The more so if the theory proposed can get some tangible support.

The assumption that pathological currents* shorting in the hearing mechanism is at the bottom of otosclerosis would harmonize with all that is known of pathological currents, and all that is known of otosclerosis, and at the same time provides a working hypothesis, which in the end gets considerable therapeutic support.

The following group constitutes a short, but unselected series of cases, all characterized by varying degrees of tinnitus, and progressively blunted hearing, and all free from any history of otitis media, and all cases in which a diagnosis of beginning otosclerosis seems justified. The results here achieved are what the writer believes may be reasonably expected from this class of cases.

Case A: L. C., age 48 years, retired U. S. Army officer, reported for treatment. Hearing in left ear normal, but in right could hear watch against ear, duration four years or so.

Only treatment consisted of cocainizing the right nasal ganglion every other day. Patient dismissed ten days later, hearing watch, 14 inches.

Case B: W. P. M., age 38 years, reported Sept. 29. Hearing in both ears reduced to watch against ear, duration four months or so.

Nasal ganglia both cocainized Sept. 29, Oct. 1, 5, 6, 7, 8, 9, 10, 11 and 13, when patient was dismissed, hearing same watch at arm's length, either ear.

Case C: B. L., age 23, failed to pass air service examination on account of his hearing. It was found that he could hear watch, right, 3 inches; left, against ear.

*Possibly a better term to be used in this connection than "otosclerosis" would be "progressive deafness".

Both ganglia cocainized every other day for two weeks, when it was found that the hearing was: right, 6 inches, and left, 14 inches. He passed from observation at this time.

Case D: Mrs. R., age 52 years, reported March 9; hearing: right, watch at 3 inches, left, watch at 1 inch. Ganglia cocainized March 9, 10, 11, 12, 14, 15, 16, 17 and 25, when she was dismissed; hearing: right, watch at 15 inches; left, watch at 7 inches.

Case E: Age 55 years, reported March 26; hearing in right, 4 inches; left, watch against ear; duration five years. Ganglia cocainized March 26, 30 and April 4, when hearing was found to be: right, watch, 24 inches; left, watch, 2 inches.

Case F: Mrs. S., age 63 years, reported March 19. Hearing: right, 3 inches; left, against ear. Ganglia cocainized March 19, 21, 23, 26, April 1, 4 and 6, when it was found that the hearing was: right, 6 inches; left, 1½ inches. Mrs. S. has experienced the least benefit of any case yet tried. She is in the sixties and the process has been noticed four years. Whether that is responsible, I know not. But, even so, in her case the process has been apparently arrested, and the hearing improved about 100 per cent, measured in terms of inches at which she could hear a watch tick.

This line of therapeutics is based upon the theory of pathological currents, the assumption being that the patient in these cases is suffering from an "overcharge", which is "shortening" in the hearing mechanism, and which is accordingly at the bottom of the pathology. Since the ear is within the nasal bloc, such current can be intercepted at the nasal ganglion. That done, according to the theory, the actual exciting cause of the pathology is removed, and the process then recovers. In any case of progressive deafness, in its earlier stages, cocainization of the nasal ganglion of the same side would seem to be a justifiable procedure, and will frequently yield gratifying results.

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ANOMALOUS DEVELOPMENT OF SPHENOID.*

DR. JULIUS I. KLEPPER, New York City.

The sphenoid sinus anomalies can be divided into those of location or extension of the sinus into the surrounding structures, and those that take place in the sinus itself. Therefore, into endosinus and extrasinus anomalies, endosinus anomalies are those of the true septum and those of accessory septa and dehiscence.

As to the true septum anomaly—the most important is the change of course, instead of dividing the sphenoid into more or less two equal parts, we have the condition where the septum deviates rapidly and changes the sphenoid sinus into one that comes in contact with both sides of the brain—therefore with the cavernous sinus on both sides, and the structure contained in them as the third-fourth first division of the fifth and sixth nerve and the internal carotid artery. A sinus of this kind will give bilateral symptoms.

Another endosinus anomaly is a membranous septum—formed by the mucosa, not bony septum. Under this heading of endosinus anomaly (that changes into extra) we may add different forms of diverticula of the mucous membrane through a dehiscence part of the bony walls, connected with the dura and the arachnoid (Schaffer).

Anomaly As to Size: Another anomaly is no sinus or a too *small* sinus, and I am referring to a particular specimen that I had to find in our course of operative sinus surgery, the student was quite worried why he could not find the sphenoid after exenteration of the posterior ethmoids. We were able to demonstrate a sphenoid not larger than a pea, but very large posterior ethmoid cells replacing the sinus entirely. This leads us also to the next classification, and we classify the *large sinus* with *extrasinus anomaly* and abnormality in form of excessive size. When the sinus reabsorption goes on, not only in the body of the sphenoid, but also into the other parts of the sphenoid bone. Cases where reabsorption goes on forward toward the lesser wing encircling the optic nerve. If a dehiscence takes place in this case the nerve may be located altogether within the sinus and show symptoms according to the pathological changes in the sinus.

We may have reabsorption that may cause a dehiscence in the superior wall, in this case the pituitary and the chiasma may lay

*Read before the New York Academy of Medicine, Section on Laryngology and Rhinology, May 25, 1927.

Editor's Note: This ms. received in The Laryngoscope Office and accepted for publication June 24, 1927.

also exposed to the sinus mucosa. Reabsorption may go to the lateral wall and include the cavernous sinus and again expose the structures within the cavernous sinus to the more direct pathological changes within the sinus.

Under extrasinus-reabsorption, we have reabsorption into *a* lesser wings, reabsorption into *b* pterygoid plates, and that *c* in the palate



Fig. 1.

Fig. 2.

Fig. 1. Excessive reabsorption—large sphenoid sinus.

Fig. 2. Large lateral recess in the sphenoid.



Fig. 3. Excessive lateral recess—secondary septa.

bone. In the case of *b* and *c* the sphenomaxillary fossa and its contents come in direct contact with the sphenoid sinus, and the symptoms accordingly include those of the veins, arteries, nerves and especially those of Meckel's ganglion, as seen in a recent specimen added to our collection, the sphenoid coming over to meet the max-

illary sinus at the upper posterior angle. This specimen also shows a large accessory partial septum coming posteroanterior, and also shows the normal septum deviated from the median line. This specimen also shows the normal septum has been thinned out by reabsorption to the extent that part of the bony septum is dehiscant, which to me proves that the septum may possibly become dehiscant,

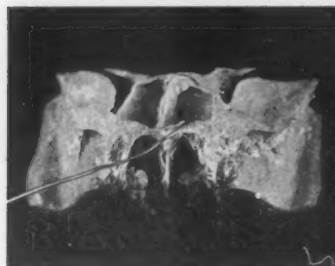


Fig. 4a.

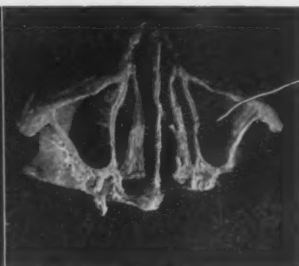


Fig. 4b.

Fig. 4a. Large sphenoids meeting the antra.

Fig. 4b. Antra-excessive reabsorption toward sphenoid.

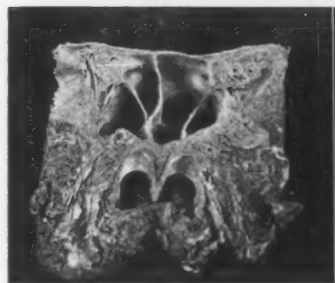


Fig. 5.

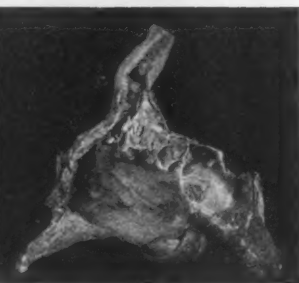


Fig. 6.

Fig. 5. Numerous septa of sphenoid.

Fig. 6. Normal septum—with anomalous reabsorption.

even if not pathologically broken down, the same may apply to the frontal sinus septum.

You may understand that the method of operative procedure will be best in a case like this, where the lower portion of the sphenoid sinus comes in contact with the antrum, that is, to open the antrum and then the sinus, or do an operation via intranasal and antrum. I do want to mention passingly, there are cases where the internal

carotid artery may be totally within the sinus, when dehiscence of the external wall has taken place.

May I add here an anomaly that I have not seen mentioned, but very passingly in any textbook about the *depth* of the recessus sphenothmoidalis? At times, this recess may be so deep that it resembles a large sinus cell; we will show such specimen, and it may be this very recess that would keep up suppuration after sphenothmoidectomy if the operation was not complete and this recess was not opened thoroughly; this also is a rare specimen.

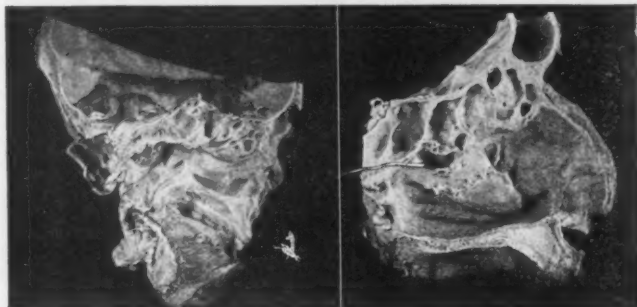


Fig. 7.

Fig. 8.

Fig. 7. Secondary-septum with large ptergoid recess.

Fig. 8. Very large recessus sphenothmoidalis.

Other anomalies are the excessive extension and displacement of the sphenoid sinus over the ethmoid coming in contact with the frontal sinus.

One more anomaly mentioned by Zuckerkandl is an opening into the maxillary and no opening into the nose—this may be so if his view is correct, that the sphenoid sinus develops from the maxillary as in the mycelles seniculus which he gives as an example. We have failed as yet to find such a specimen.

24 West 85th Street.

NASOPHARYNGEAL CYST OR LUSCHKA'S BURSA.*

DR. WILLIAM HEWSON, Philadelphia.

The case of nasopharyngeal cyst which I have to show and report is L. Z., a female, age 24 years, who was admitted to Dr. George M. Coates' service at the Medico-Chirurgical Hospital for Tonsillectomy. She wanted to have the operation done under a general anesthetic, and, since there were no evident contra-indications, nitrous oxide, oxygen and ether were administered. The tonsils were removed by the La Force method and when the nasopharynx was routinely investigated, the following strange condition was discovered:

Placed vertically in the middle line on the posterior wall of the nasopharynx, just above the level of the palate, was found a lozenge-shaped smooth mass about the size of a large almond. It did not seem to fluctuate, but was compressible and resilient. It was not movable. By retracting the soft palate, forcibly, the lower third was seen to be a little grayish in color but not much different from the neighboring mucous membrane. Pressure did not reduce its size or change its outline and there was no demonstrable opening into it. When an incision was made into it, a grayish-green pus exuded, as if under pressure. There was no odor and there seemed to be quite a quantity of this material, which was of the consistency of peanut butter. The incision was enlarged and the cavity curetted. There seemed to be a fibrous capsule, no communicating sinus, and the bone underlying was not exposed.

The nasopharynx elsewhere was comparatively normal. There were some small adenoid vegetations attached to each lateral wall extending into the fossae of Rosenmueller. These were rubbed out. There was no central adenoid mass and there were no palpable nasopharyngeal nodes.

The diagnosis of nasopharyngeal cyst, or cold abscess, was tentatively made pending further investigation. The patient's history did not throw much light on the situation. She had evidently been advised to have her tonsils out on account of a previous history of neuritis, rheumatism and upset stomach. She did, however, say that following influenza, she had slight pains in her left chest, which persisted for a while and, on suggestion, admitted mild night sweats.

*Read before the Section on Otology and Laryngology, College of Physicians, Philadelphia, Oct. 12, 1926.

Editor's Note: This ms. received in The Laryngoscope Office and accepted for publication March 14, 1927.

Physical examination on the day after operation revealed to and fro friction rubs over her upper left chest posteriorly and slight enlargement of her right heart; otherwise nothing of consequence was found.

A blood count was made and found normal except for a mild chlorotic anemia. X-ray examination of chest showed mottled fibrosis through both lungs, particularly the upper lobes, indicating X-ray evidence of a tubercular process.

Laboratory report of the culture from the pus removed at operation showed staphylococci. This may have been from contamination, however. The pus looked very little like staphylococcic pus and certainly resembled strongly that we often get from sterile cold abscesses.

Thornwaldt's disease was suggested as a possible diagnosis but, on due consideration was rejected because of the absence of any central adenoid mass. Some of the older textbooks tell us that Thornwaldt's disease is a suppurating condition of the median furrow of the adenoid mass, or pharyngeal tonsil. This results from a growing together of the two lateral masses of adenoid tissue and blocking up of this furrow with retained bacteria and cell detritus, which is exuded from time to time as pus.

Luschka, in his descriptions of the pharyngeal tonsil, also described a bursa or recess in the median posterior line of the nasopharynx. This little pouching is said to occur just below the pharyngeal tonsil and becomes constricted at its point of origin so as to communicate with the surface by only a minute opening. This sacular pouching extends toward the basilar part of the occipital bone and lies in the loose areolar tissue of the sinus of Morgagni. A good diagrammatic picture of this is shown in Toldt's anatomy and a description of the pharyngeal bursa or Luschka's bursa is found in many of the older works. The more modern anatomies either make no mention of it or deny its existence altogether.

The applicability to this case is evident for it is in exactly this region that the cyst was observed and it is quite conceivable that what we have in this case may be a greatly enlarged pharyngeal bursa. Suppuration could easily occur as in Thornwaldt's disease and the opening could very easily become closed at times and not discernible.

The diagnosis of a suppurating lymph node in this region had to be considered but may be disposed of by the fact that a lymph node in the loose tissue of Morgagni's sinus would be movable and not intimately attached to the mucous membrane as this mass was.

1721 Pine Street.

CASE REPORTS: COMPLICATIONS OF LOCAL TONSILLECTOMY.*

DRS. MCCLINTOCK and TRIBLE, Washington, D. C.

The following cases are reported to invite discussion on what is usually considered a very much worn topic. They were both men of good physique, in otherwise good health; in short, were good risks.

Case 1: G. J. N., corporal U.S.M.C. Admitted to the U. S. Naval Hospital, Quantico, Va., March 24, 1926, for tonsillectomy. Family history negative. Previous history negative, with the exception of numerous attacks of acute tonsillitis. Tonsils were moderately large in size, with scarring and evidence of numerous previous infections. Enlarged lymphatic at the angle of the jaw, right. Coagulation time, five minutes; temperature, pulse and respiration normal; urine negative. Prepared for operation.

March 26, 1926: Tonsillectomy, 1:30 p. m. Local anesthesia. Operation uneventful. At about 7:30 p. m., same night, visited by the operator—general condition good, throat clear. At about 8:00 o'clock patient complained of a choking sensation and examination shortly afterwards showed a livid edema of the fauces, soft palate, glottis and pharyngeal wall. Atropine and adrenalin given. Condition rapidly became worse, swelling occluding the throat, forcing the tongue out of the mouth, externally swelling from the parotid areas to the clavicle and involving the anterior sub-mental area as well. This swelling was tense, brawny and an emergency tracheotomy was performed, with relief of respiration. Atropine was continued by hypodermic and calcium lactate and glucose by rectum. The next day the edema had abated somewhat, but about 4:00 o'clock, in spite of digitalis, the heart had begun to fibrillate and an edema of the lung supervened. Strychnin and oxygen were administered with temporary improvement. On March 29, at about 5:00 a. m., patient became markedly worse and died about 8:30 a. m. Autopsy not permitted.

Case 2: W., Lt. com., M. C., U.S.N. Admitted May 14, 1926, with peritonsillar abscess, right side, which was opened and drained the next day. Uneventful recovery. May 24, nine days after the drainage of the peritonsillar abscess, the inflammation had subsided, general condition being good, history negative, a local tonsillectomy was performed by Dr. McClintock about 9:30 in the morning. At about 4:00 o'clock patient complained of swelling and discomfort on

*Read before the Eye, Ear, Nose and Throat Section District of Columbia Medical Society, March, 1927.

the right side. Inspection showed beginning edema of the soft tissues about the right tonsillar fossa. This continued and progressed, involving the soft palate, uvula and opposite side slightly, and externally manifested itself by swelling from the angle of the jaw to the clavicle and slowly invading the tissue to the midline and to the opposite side just under the chin. The soft tissues and palate, fauces and pharynx were tense and rather pallid. Multiple incisions of the edematous areas of the fauces were of no benefit. Atropine and adrenalin pushed with no result. Dr. Tribble was called in consultation and arrived about 11:00 p. m. Oxygen administered, breathing was labored, absolute quiet advised and a careful watch kept on the pulse. Calcium lactate was given by rectum. A little after twelve, pulse began to go up, respiration very labored, evidence of heart action being weakened and a low tracheotomy was recommended. This was performed by Dr. Tribble under procain infiltration uneventfully, Jackson's instruments and technique. Breathing immediately re-established, normal rate and heart action improved. Very little change in the swelling during that night. Next morning, pulse 100, temperature about 100,^o respiration very slightly increased, and during the afternoon swelling slightly decreased. General condition good.

On May 26 there was no general improvement: temperature, 100.2^o by axilla; pulse, 110; respiration, 22; W. B. C., 14,500; differential, polys. 74 per cent; lymphs, 20 per cent; large mononuclear and transitionals, 6 per cent; hemoglobin, 80. Smears from the throat negative for Vincent's and Klebs-Loeffler. Urine negative, except a few leucocytes; chest not involved, could swallow, liquids forced. On May 27, general condition slightly improved, local condition in the throat considerably improved; but the external swelling had changed to a dusky red.

On May 28, local condition had sufficiently improved to permit removal of the tracheotomy tube by Dr. Woodland. On May 29, the right side of the neck had become more brawny and showed some fluctuation and during the night it encroached sufficiently on the trachea to cause embarrassment of respiration and necessitated replacement of the trachea tube to relieve the symptoms. On May 30, there was sufficient localization, externally, to permit incision, which was made at the angle of the jaw under local anesthesia, a large abscess was broken into and cigarette drain inserted. Culture taken from the pus later showed a pure staphylococcus aureus. The next few days the swelling subsided rapidly, the general condition rapidly improved, tracheotomy tube removed and not replaced, both external wounds closed, and on June 14 he had practically recovered.

The solution commonly used in tonsillectomy by the operator had been 0.5 per cent of procain by deep injection. The senior on the service, who had recently reported, had been using 2 per cent procain and this strength had been used on several cases, with no cause for alarm. These two cases reported were done with a 2 per cent procain solution, which was made up in camphor water, 0.8 per cent. The technique employed was injection of the anterior and posterior pillar over the apex of the tonsil and a deep injection exterior to the tonsil and interior to the constrictor muscle of the pharynx and in the region at the base of the tonsil. Four to 5 c.c. of the procain solution had been used on each tonsil. In the second case, more solution had been necessary on the right side, due to the previous peritonsillar abscess. This was the side which developed the edema. Removal was by sharp dissection to the base and then the snare. In each case the severe edema started about seven hours after the operation, rapidly became very livid, but was not affected by incisions, atropine, adrenalin or strychnin. The second case survived, due to an early tracheotomy and conservation of the strength of the heart and early localization and breaking down of the involved tissue.

Discussion: The clinical picture presented by the second case reported was that of a man suffering from edema of the glottis and glottic tissues, and called for relief, no matter what the cause. It was startling and, to the consultant, a picture never before seen, following tonsillectomy.

The first case reported had died just a few weeks before; it was mentioned and discussed, and at that time believed to have been due to an angioneurotic edema. It did not seem reasonable that two cases of angioneurotic edema should occur in such a limited body of man and various hypotheses were considered, such as the puncturing of one of the large vessels and a suffusion of blood and serum from a thrombus, a chemosis from the fluid used for injection, which contained camphor, notorious for its irritating properties in the tissues. It seemed too early for the development of an infection.

Several years before, while discussing the pros and cons of deep injections before tonsillectomy, Coates mentioned a case in his personal experience in a training camp, of an abscess forming, which burrowed down and discharged in the esophagus, resulting in death, and another case, of which he had no personal knowledge, but had heard discussed. It would seem that the camphor solution, plus concentration, produced a chemosis, edema, strangulation, impairment of heart action and edema of the lungs, with death in the first case; and in the second, a chemosis and breaking down of tissues with a

staphylococcic invasion of the organisms, which were present but not multiplying, from the previous peritonsillar infection. The early low tracheotomy and the later localization of the infection and its surgical drainage saved the life of the second patient.

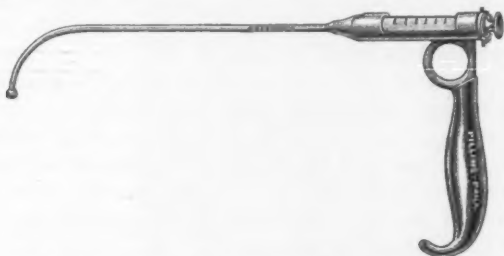
This has been of great interest, as the patient himself will tell you. As a surgeon, he has discussed this matter with many specialists throughout the country and has had many theories advanced.

A survey of the literature of similar cases, of which relatively few have been reported, would lead to the opinion that infection is, as a rule, carried in on the needle point during the deep injection.

A NEW LARYNGEAL SYRINGE.*

DR. SIDNEY YANKAUER, New York City.

This syringe was designed in order to have a laryngeal syringe which would be easily sterilizable, with a transparent barrel and convenient to handle. It consists, as the illustration shows, of a handle and a laryngeal cannula. The handle is constructed so as to provide a recess into which an ordinary Luer glass syringe of 2 c.c. capacity can be quickly and easily inserted and as quickly and easily removed, permitting the handle and cannula to be separately sterilized.



The cannula is made of virgin silver, so that it can be bent to suit the individual user and its end is provided with a small ball, the purpose of which is not only to insure uniformity in the size of the drops but it has been found to have the further advantage of fixing the attention upon the end of the cannula, which greatly facilitates placing it in the desired position.

The device is manufactured by the George P. Pilling and Son Company, Philadelphia, Pa.

121 East 60th Street.

*Read before the meeting of the Eastern Section of the American Laryngological, Rhinological and Otological Society on Saturday, Jan. 8, 1927.

AUTODILATATION IN CICATRICIAL STENOSIS OF THE ESOPHAGUS.

PROF. GEORGES PORTMAN, Bordeaux, France.

The primordial quality of the therapeutic maneuvers practiced in the cavitary organs, like the esophagus, is, in my opinion, the gentleness which, sheltering the walls from all violent trauma, renders the treatment harmless.

It is one of the reasons which causes me to prefer in the very important cicatricial stenosis of the esophagus the autodilatation to the dilatation by the physician: the autodilatation, that is to say, a dilatation practiced by the patient himself without him knowing it, the progression of the dilatator instrument doing under the mere action of the peristaltic movements of the esophageal walls.

The principle is that of endless dilatation, described in all the classical books, but to which technique we have brought various improvements.

When we are before a cicatricial stenosis which is difficult to get over and rendering the alimentation insufficient by normal ways, we practice, at first, a gastrostomy under local anesthesia. The cicatrization of the stomachic wound over, a filiform bougie is pushed in from top to bottom through the stricture and under the control of the esophagoscope as far as the stomach.

The extremity of the bougie is sought for in the stomach and is taken out through the opening of the gastrostomy.

This last step, very easy in theory, is, in practice, not easy and sometimes even one comes across insurmountable difficulties.

The proceedings are numerous for taking out this probe, but they are all more or less blind, more or less difficult to execute, and not one gives the certitude of success.

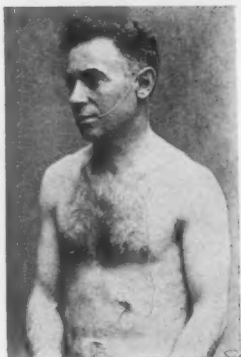
Knowing the facility with which one discovers with a prism instrument a foreign body in a bladder distended with water, Dr. Lafargue had, in my service, the idea of using the same proceeding for the stomach.

One must use a prism operator cystoscope, such as the "pince prenante" cystoscope of Papin.

The patient having fasted for twelve hours, is lying down, the bust slightly raised. By the mouth of the gastrostomy, one introduces

Editor's Note: This ms. received in The Laryngoscope Office and accepted for publication May 23, 1927.

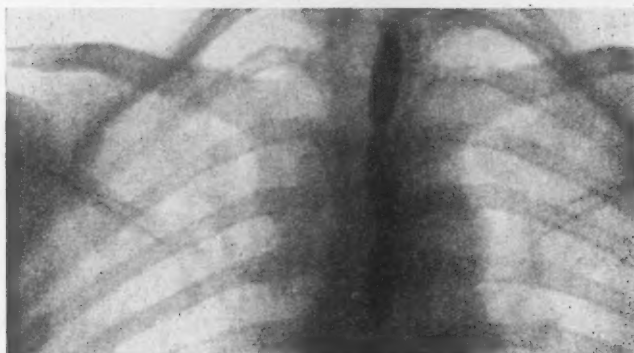
a probe of Nelaton No. 22, supplied with three or four eyes, by which one washes the stomach with a hydrocele syringe, by sucking out the boiled water as soon as it has been introduced. Generally, the liquid becomes clear rapidly. One supplies then the stomach with 300 or 400 c.m. cubes of boiled water and there is nothing more to do but introduce the cystoscope. One must stand on the right of the patient, and as soon as one feels that one has penetrated into the stomach, after having made of the whole dressing half a turn of 180 degrees, one puts below the beak of the objective of the instru-



ment and one inclines the ocular towards the abdominal wall in bearing it very slightly to the right shoulder and then one pushes in the instrument as if one would make it come out by the left side. Following this axis, one makes it move backwards and forwards, varying its obliquity, keeping it vertical without rotation either to the right or left. One thus explores the posterointernal wall of the stomach, on which is the bougie and on which the cystoscope is almost perpendicular. Having perceived it from this high point, one draws near it and when one is within reach, one takes it. One has

only to take away at the same time the cystoscope and the bougie which is fixed there. One empties the stomach with a probe and one fixes a thick silk to the extremity of the bougie.

In short, this technique of exteriorization precedes directly that of the extraction of certain foreign bodies of the bladder. It is easy for one who is accustomed to the use of the prism cystoscope, who will be able to execute it in ten minutes, provided that the cleaning



of the stomach has been thorough. Generally it takes fifteen or twenty minutes before the middle is soiled or the liquid rarefied to the point that it is necessary to begin again the preparatory step to the extraction. It is not necessary to have a large aperture; it is enough that the cystoscope can go in. No need of a preliminary hypoesthetic preparation of the subject, for it is painless.

It seems to us then that this proceeding, by its simplicity and its precision, is susceptible of advantageously replacing the other techniques of exteriorization of the bougie and to facilitate the installation of the endless dilatation.

The bougie, at the extremity of which a thick silk has been firmly fixed, is withdrawn from bottom to top and thus is established an endless thread coming out by the mouth above and by the opening of the gastrostomy below. On this thread are fixed dilatatory olives, of which we possess a whole series, graduated in millimetres: One place three end to end of the diameter, gradually increasing, the narrowest being placed underneath in order that it enters the first in the stenosis. It is necessary to leave no laxity between these olives if one wishes to be sure of their normal entrance in the narrowed part of the esophagus; as one can see it on the X-ray plates which accompany this work. I employ at the present time metal olives, the bone olives having the inconvenience of being gradually digested by the patient.

The olives being fixed, one makes on the silk points of joining mark by two knots, one showing the distance of the dental arches at the lower extremity of the first olive just when it is about to enter the stenosis: the other the distance of the dental arches at the superior extremity of the third olive, when it is completely entered in the stenosis. One knows then exactly when the three olives have penetrated into the stricture.

This movement of progression is due to the esophageal peristaltism: it is very soft, continual does not provoke spasm, consequently fulfilling the optima conditions of the therapeutic dilatation.

When the olives have passed the stricture, they fall into the stomach, fall that the patient feels perfectly. They take on an average three to six days to pass over the stenosis.

The olives, once in the stomach, are drawn out through the opening of the gastrostomy, cleaned or changed for a superior kind and replaced in the mouth.

Owing to this method, which requires evidently a very long treatment: several months or several years (three years in one of my observations), I have never had yet a failure in the cases of cicatricial stenosis of the esophagus, the most by caustic that I have had to attend these last years.

PHYSICAL THERAPY AS AN AID TO SURGICAL PROCEDURES IN THE NOSE AND THROAT.*

DR. JOHN MCCOY, New York City.

This paper is not intended as a dissertation upon physical therapy, but rather as a recitation of a number of interesting cases in which physical therapy has been of service in bringing about a cure after operations in the nose and throat. Before proceeding to a recitation of these cases we shall outline the physical therapeutic agents we have used and define the scope of some of them. In our list of cases we have used surgical diathermy, the galvanic current, the ultra violet ray and radium. Of these, the term diathermy has been used promiscuously so that perhaps an explanation of what it is and how it acts would be in order before we proceed to a description of its use.

Diathermy is a therapeutic procedure by means of which alternating currents of high frequency are passed through the body in order to produce heat within the body.

Before the invention of the high frequency current the only currents used were galvanism and faradism. The neuromuscular reactions induced by these currents precluded the possibility of the use of any but the smallest doses, either a few miliamperes of the galvanic or one miliampere of the faradic current. In these small currents no effective heat values could be obtained. The high frequency current was first devised as a high frequency alternating current. High frequency currents are alternating currents having a frequency of oscillation which exceed the limit to which muscle tissue will respond. The frequency of oscillation usually employed in therapy varies from one to two and a half millions per second, and when the current is made to pass through the body the resistance of the tissue generates heat.

The high frequency current was devised about 1892, and was first used by D'Arsonval. At about 1904 or 1905 it first became of practical value and the current was called diathermy, or endothermy, because the heat was produced within the body itself and not at the electrodes, that is, if the electrodes are of the same size. If, however, we have one very large electrode and one very small electrode the heat will all be generated at the small electrode.

*Read before New York Academy of Medicine, Section on Laryngology and Rhinology, March 23, 1927.

Editor's Note: This ms. received in The Laryngoscope Office and accepted for publication May 21, 1927.

By the use of this agent any degree of heat can be manufactured in the human tissue, from 99° F. to approximately 135° F. When heat is generated from 99° to 124° F. for therapeutic purposes it is called medical diathermy. When a stronger degree of heat is produced, tissue destruction begins, and at 135° F. we have reached the stage known as surgical diathermy, or electro-coagulation or desiccation, or the high frequency knife. In this paper medical diathermy is not used, but rather surgical diathermy for the purpose of cutting or desiccating, or coagulating the tissues.

To proceed in order, the writer will describe the cases treated, beginning with the nose, going to the nasopharynx, and ending with the larynx. In the first place, the writer has encountered a certain type of ethmoiditis and sphenoiditis in which, after surgical correction, there appears from time to time small polypi which interfere with the healing of the parts operated upon. In many cases this condition necessitated a long course of after-treatments before a cure could be brought about. The writer has found that this type of case responds very rapidly to the desiccating current and wishes to present the applicators which have been designed for him through the courtesy of Wappler & Company.

Another type of case which, in the past, has proved disheartening, has been the case in which we have opened our sphenoid with what we thought was a good sized opening for drainage, only to find that after a few months had passed by, connective tissue had grown across the opening, leaving a very minute opening in the sphenoid. When this was removed a tendency to recurrence of the same process took place. Since the use of surgical diathermy, the writer has found that one application with this current leaves a nice wide opening in the sphenoid, with no tendency to recurrence of its closure. We now pass to the nasopharynx, where we shall recite the history of a very interesting case of nasopharyngeal fibroma.

This occurred in a boy, age 10 years. The growth occupied the entire nasopharynx, extended forward into the nose, and by erosion protruded into the antrum on the left side. A section removed showed that the growth was very bloody and extremely large. The section was examined by Dr. Fraser, of the University and Bellevue Medical College, who reported it to be a fibroma, malignant only in its tendency to recur, but with no tendency to involve the surrounding glands. It was decided to perform the Moure operation and remove the growth through the nose after first tying off the external carotid artery. The growth was entirely removed and was found to have its origin in the occipital bone at the top of the nasopharynx.

The base of the growth was cauterized after removal. The boy returned after about three or four months and the entire nasopharynx was completely filled with a growth which seemed much more vascular, profuse bleeding occurring on the slightest pressure of the growth. We thought that we might be able to remove this growth by means of the ordinary electro-cautery, but it proved absolutely useless as the flow of blood immediately destroyed the heat in the cautery. At this stage we might say that a resort to radium was considered, but on account of the extreme vascularity of the growth it would be difficult to place the radium needles or seeds in the place desired as the profuse flow of blood absolutely destroyed all landmarks.

The writer might here mention a case of nasopharyngeal fibroma in which he placed the radium in a growth both intranasally and postnasally with very excellent results. This seemed impossible, however, in this case as the profuse bleeding obviated all attempts at placement. We finally decided to use the high frequency current, after first tying off the common carotid artery. This current was used on three successive occasions and the growth was finally obliterated.

Another interesting case was that of a patient who had had an operation on his accessory sinuses on three different occasions. The result was good in all except the right antrum, in which there was a small opening and from which there came a discharge of mucopus, which the patient decided was giving him many symptoms of focal infection. I first advocated the enlargement of the opening in the antrum, but the patient absolutely refused further surgery and we compromised by trying the zinc ionization by means of the galvanic current. The writer wishes to show a special applicator which was made for this purpose. The result was that after several ionizations the antrum cavity was dry and has remained so ever since, a period approaching one year or more.

Since using physical therapy I have had two cases of adenocarcinoma of the sinuses, but I have had such excellent results with radical sinus surgery, followed by radium, that I have not used diathermy. If, however, I were confronted with a case of sarcoma of the antrum and ethmoid I would use diathermy in preference to surgery.

In the removal of tonsils of bleeders I think surgical diathermy is the method of choice. To illustrate, we had a case which gave a history of bleeding and the blood clotting time was found to be fifteen minutes. In this case a young man, age 26 years, was given local anesthesia and the tonsils enucleated by the endotherm knife,

plus the coagulation current, with little or no bleeding, and likewise with about the same reaction as one would get after removal by surgical dissection.

The ultra violet ray we use in nearly all cases of nasal and throat surgery and feel that we obtain a greater sterilization of the wound and quicker healing than without its use. We had one very interesting case in a woman, age 50 years, with a growth occupying the center of the dorsum of the tongue. It was about 1 inch wide and $\frac{1}{2}$ inch long and raised about $\frac{1}{4}$ inch. It seemed to deeply infiltrate the tongue and gave every appearance of malignancy. A section was removed and the report returned that it was chronic inflammatory tissue, also that there were many Vincent's spirillae. She was given, by mouth, daily applications of the water-cooled ultra violet ray and in about two weeks the entire growth had disappeared.

I will now relate two cases of laryngeal cancer involving the vocal cord. In one case the entire vocal cord was removed after a preliminary tracheotomy, followed by a laryngotomy. There was much bleeding during the removal of the growth. The growth was submitted to the pathologist and he reported it as a case of epithelioma, but noted that there was still cancerous tissue at one very thin margin of the growth. In other words, the growth extended in a superficial manner slightly beyond where we had removed it. In this case we applied radium 30 m.gr. externally for three hours, and 20 m.gr. intralaryngeally for one-half hour on two successive occasions and so far there has been no signs of recurrence after a period of about one year and a half.

In another case of cancer of the vocal cord, the endotherm knife was used to make the preliminary incision down to the trachea for the preliminary tracheotomy. Also, the endotherm knife was used in making the incision for the thyrotomy, and for the complete removal and desiccation of the growth by means of the high frequency current. We feel that in other similar cases we could do away with the preliminary tracheotomy because of the entire absence of bleeding, which was controlled by the coagulating diathermy.

S. W. Corner 57th Street.

DERMOID CYST OF THE DORSUM OF THE NOSE. CITATION OF CASE.

DR. V. K. HART, Statesville, N. C.

The case cited below is the first case ever coming under observation of the writer. Indeed, as will be shown later, this condition is extremely uncommon.

A brief review of the history is first given.

C. C.: Periodically discharging sinus midnasal line. H. P. I.: *Since birth* has had a small area on the dorsum of the nose which periodically discharges pus or sebaceous material. Hairs are always visible in the sinus tract and have bothered the patient for cosmetic reasons. Also some odor is at time noticeable. Two months ago an unsuccessful attempt was made by another doctor to excise the tract. P. M. H.: Nothing of value. F. H.: Negative.

Physical Examination: General: Robust male, age 25 years. *Eyes:* Entirely negative. *Nose:* Over the lower crest of the nasal bones in the midline is a small circular opening from the mouth of which several hairs project. There is no discharge, swelling or tenderness. Other than this the nasal findings are negative. *Ears:* No findings of importance. *Throat:* No gross pathology.

To conserve time and space, the rest of the physical findings are not recorded because such were all negative.

Laboratory: The X-ray shows no pathology of the nasal bones or sinuses. There are no other findings of importance.

Tentative Diagnosis: Dermoid cyst of the dorsum of the nose.

Operative Procedure and Findings: On Feb. 28, 1926, the tract was carefully dissected from the surrounding tissues. No underlying bone involvement was demonstrable. The tract extended clear to the nasion. Counter drainage was done into the anterior nares, a rubber drain thus inserted and primary closure done.

Aftermath: Despite counter drainage the wound broke down shortly after operation. By means of repeated cautery with 50 per cent trichloracetic acid, the wound finally healed by secondary intention. The patient was discharged as cured at the end of the eleventh week. The cosmetic result was good and has remained so. He has

Editor's Note: This ms. received in The Laryngoscope Office and accepted for publication May 5, 1927.

*From the Department of Head Specialties.

been under observation for a year since dismissal and there has been no recurrence.

Discussion: The specimen of the tissue was sent to the Department of Pathology of the State Medical School and the report is quoted verbatim: "Sections show small bits of striped muscle and masses of dense connective tissue. There is a very scanty diffuse infiltration, with lymphocytes. There are a few small globular masses of stratified squamous epithelium imbedded in the connective tissue. There is nothing upon which to base a positive diagnosis. It was probably a dermoid cyst."

It is believed a more positive pathological diagnosis could have been made had this been the first operation. This being the second operation, a large part of the original tissue had been previously resected.

However, there are three things which point definitely to dermoid cyst in the case under discussion: 1. the existence since birth; 2. the constant finding of hairs in the tract; 3. the extreme difficulty of securing permanent healing.

Sutton gives the following explanation for the origin of such a tumor: In the early embryo, the rudiment of the nose is represented by that process of the primitive skull which is known as the frontonasal plate. This is separated from the lateral portions of the face by the orbitonasal fissures. The rounded angles of the frontonasal plate are known as globular processes. Each process forms a portion of the ala of a nostril and the corresponding premaxilla. These processes fuse in the middle line and give rise to the central median piece (philtrum) of the upper lip. Dermoids of the nose are invariably situated in the line of the internasal fissure and are in all probability due to incomplete fusion of the globular processes.

In the literature of this country and abroad only some seventeen cases have been reported. The earliest cases appear to be those of Lawrence, reported in 1837 in the *London Medical Gazette*. Brannan, in 1888, reported three cases. Stewart, in 1897, reported a deformity of the nose which, from the history given, evidently had its origin in a dermoid cyst. In 1898, Ligorio cited one case.

In 1901, Birkett published three cases. The first patient was a boy, age 16 years, who complained of a sore near the tip of the nose, in the midline; a lump near the tip of the nose had been present since birth. The discharging sinus was curetted and was found to contain sebaceous material and some fine hairs. The cosmetic result was good.

The second case was that of a boy, age 8 years, who had had a growth on his nose since birth. There was an oval tumor, occupying the greater portion of the bridge of the nose. The specimen was found to contain caseous material, flat crystals, pale hairs and unstriped muscle.

The third case, a supplementary note to the article, was that of a girl, age 9 months, who had a tumor the size of a pea in the midline of the nose near its tip.

DeCarli, in 1903 reported the case of a boy, age 16 years, with a dermoid cyst of the dorsum of the nose and cicatricial deformity. An operation was performed with a good result.

Johnson, in 1904, reported a case in a man, age 28 years, who had a lump at the roof of his nose of three years' duration. The growth was fluctuating and translucent. On examination, the specimen removed at operation proved to be a thin-walled dermoid containing opalescent fluid.

Yearsley, in 1912, reported a case in a girl, age 5 years, who presented a swelling in the median line of the nose. This lump had first been noticed two years previously, since which time it increased progressively in size. It was soft, elastic and boggy; there was no fistula. When removed, the tumor was found to contain a grayish putty-like material and was lined with fine hairs.

Greig, in 1917, reported the case of a boy, age 2 years, who was born with a double hare-lip and cleft palate, and who also exhibited, in the left frontonasal region, a thin-skinned reddish tumor, 1½ inches in length. This was reported to be a congenital tumor containing fibrous tissue, unstriped muscle and other tissues.

Bruzzone, in 1922, reported two cases. Marchini, in 1923, reported a case in a boy, age 16 years.

A more common congenital deformity of the nose is obstruction of the posterior nares. The writer recently reported such a case (*Southern Med. Jour.*, March 1927). She was a patient who had reached adult life without a diagnosis, despite the fact the obstruction was complete on each side.

Due acknowledgment is made of the help of Dr. Frederick Damrau, of Brooklyn, N. Y., in reviewing the literature. Such aid made available library facilities not otherwise accessible.

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Davis Hospital.

NEW YORK ACADEMY OF MEDICINE.

SECTION ON OTOTOLOGY.

(Continued from page 705.)

DR. D. L. POE (Instructor, Central Nervous System, Post-Graduate Medical School and New York Eye and Ear Infirmary): It is exceedingly gratifying to see cases brought here which show involvement beyond the eardrum. Most of us are faced now and then with a condition in which a decision has to be made whether a given case has an intracranial involvement or not. When a patient with a near lesion is brought to a physician and he observes nystagmus, he naturally thinks first that the nystagmus is a result of the ear condition; every man thinks of his specialty first. Nystagmus and an ear condition naturally suggest an intracranial involvement, and an intracranial involvement usually means an operation of a serious nature; we have to decide whether it is a vestibular involvement or whether it may be due to something else. Vestibular involvement means an operation, but nystagmus not due to an ear condition does not necessarily mean an operation. We are all of us at one time or another confronted with such conditions.

We heard that this child is the product of a consanguineous marriage. That being the case, we might be led to think that it is possibly not of a vestibular origin. In certain parts of the world, particularly Poland and some parts of Austria, we find nystagmus as the result of consanguineous marriages. What must a nystagmus be due to if it is not a vestibular involvement? Here is a child 4 years old. The mother informs us that there are two other members of the family suffering from the same condition. We have to ask ourselves whether the two other members are as old or older than this child. When we find, as in this family, that two members are considerably older than this youngster, we must say that it is in all probability a congenital condition. Examination of the child discloses a nystagmus not fully complete, i.e., the two components, fast and slow, are not as complete as an ear man is accustomed to observe. This child's nystagmus is more of an oscillatory type, although with many jerky components. On longer observation a wandering type nystagmus might also be suggested. This case when viewed in toto speaks rather loudly that it is not labyrinthine.

On looking into the literature we find that ocular conditions may bring about just this type of nystagmus. What kind of ocular conditions? Well, bad eyesight; and when we ask the child to describe a small object, necessitating the child to look intently, we observe the child had to look very closely. Well, it is very nearsighted, or perhaps its macula lutea is poorly developed. If it is a poor retinal development, it cannot see sharp figures, etc. It cannot fix.

Now, gentlemen, can I make the mistake of calling a vestibular nystagmus an ocular nystagmus, or vice versa? This youngster has a very severe nystagmus. Notwithstanding the severity we can give a much better prognosis because an ocular nystagmus does not lead to a condition of life or death, as is wont in an intracranial complication. You will find in the literature that Burton Fanning described five generations of nystagmus; McGilvray described seven generations. Now, having these conditions behind us, we have to ask ourselves, what prognosis can we offer this family who have one child? In Burton Fanning's five generations of nystagmus it was found that of those who came afterward, part of the offspring had nystagmus, part did not. Apparently none lived longer than forty-two or forty-three years. Some of these members, offsprings of the original progenitors, died at the age of 22 or 23 of tuberculosis.

In that light, I dare say that very frequently an otologist is confronted by a question put to him by an individual suffering from nystagmus: "I wish to marry my cousin, or my cousin wishes to marry me?" Can they or can they not marry? I am not in a position this evening to tell you what might be the

result of such a marriage, but I can tell you that in other conditions showing a possible inferior developmental condition, hearing, for instance, we have certain definite data. Statistics covering something like 700 marriages and 3,000 children, it was found that if one suffering from a disturbance of hearing married a member of his own family, although not with bad hearing, the percentage of bad hearing children was enough to give us concern; and if a member of the family married another member of the same family with bad hearing, the percentage of bad hearing children was alarming. If a member who is hard of hearing marries outside of his family, though the other person be hard of hearing, yet the percentage of poor hearing children is considerably lower.

In the light of these facts, might I not add, that if an individual with nystagmus comes to an otologist and asks advice as to marrying another member of the same family, also suffering from a congenital nystagmus, whether an offspring free from nystagmus would result, the answer must be that it is very doubtful. In that light I feel we owe these people as well as ourselves the benefit of our experience; and in that light also the knowing whether nystagmus is the result of a labyrinthine affection or is congenital, might help very much in deciding whether it is an operative or a nonoperative condition also.

Bilateral Suppurative Mastoiditis, Sepsis Simulating Malnutrition, Without Middle Ear or Mastoid Symptoms. Dr. Bernard Welt (by invitation).

Bilateral Suppurative Mastoiditis, Sepsis Simulating Malnutrition Without Middle Ear or Mastoid Symptoms. Dr. I. Goldman (by invitation).

For some time there has been a discussion between the pediatricists and the otologists at the Mt. Sinai Hospital as to the relationship existing between latent mastoiditis and the group of cases of infants which show rapid loss of weight, apathy, fever, diarrhea, dehydration and the appearance of intoxication.

The performance of a simple mastoidectomy, as a therapeutic measure to relieve an unmanifested aural infection in cases of prominent gastroenteric intoxication when no other demonstrable cause could be ascertained, was often advocated, especially in those cases where there was some suggestion of otitic infection. The otologists felt that unless there was clinical evidence of mastoiditis, operative interference was not warranted. However, as a test procedure, a bilateral simple mastoidectomy was performed on the following case, where the pre-operative mastoid diagnosis was not obvious and the recovery rather prompt and complete.

F. G., age 8 months, was admitted on April 8, 1927, because of several convulsion, which she had had for the past six weeks, during which she became cyanosed and frothed at the mouth, because of the fever, which had ranged around 103° F., and because she had lost about five pounds in weight. The baby had previously been in good health; had been taking cow's milk, cereals, vegetables, zweibach and orange juice. She had been gaining steadily and never had had any gastrointestinal upsets. On examination, the infant appeared to be drowsy and apathetic and had a pallor with a grayish hue. The eyes were sunken; its gaze was blank; the mouth and lips were pale and dry; the skin was of very poor turgor and presented evidence of marked dehydration. There was also evidence of rickets. The diagnosis of intestinal intoxication and marasmus was made. The examination of the ears showed the left ear to have a drum which was injected, slightly full posteriorly, with the short process visible. The right ear had no landmarks, the drum was slightly full and thickened, and there was a thin discharge coming from the anteroinferior quadrant. There was no change in the bony canal; there was no postauricular edema or mastoid tenderness. The blood count showed a hemoglobin of 58 per cent, white blood cells, 12,400, with 80 per cent polymorphonuclear leucocytes.

On April 9 a bilateral simple mastoidectomy was performed by Dr. Friesner under local anesthesia, using 0.5 per cent novocain. The right mastoid was operated on first. On removing the cortex, one got the impression that the mastoid was acting as a reservoir for the pus, which it was retaining without

any inflammatory reaction. There was not present the bleeding seen with suppurative mastoiditis. The left mastoid contained a small amount of mucoid secretion. Neither mastoid was broken down. Smears made from the secretion of the mastoid showed numerous leucocytes and some Gram positive cocci, which on culture proved to be *streptococcus viridans*.

The baby tolerated the operation well, had no pain, and reacted well, without any shock in spite of the miserable condition. At the time of the dressings the usual inflammatory reaction, with postoperative secretion from the mastoids, was absent. The wounds healed rapidly by primary union.

The infant was put on the usual intoxication treatment as soon as it entered the hospital, which was continued after operation. This consists of starvation for six hours, followed by very small quantities of milk every two or three hours, which are gradually increased to relatively normal diet, with a concomitant hypodermoclysis once or twice a day of 200 c.c. of saline. This was maintained for about ten days, until it was felt that the infant was out of the intoxication stage.

For several days following the operation, the child's general condition was not altered much. The child was apathetic and the tissue turgor was still poor. Previous to the operation, the child had not had a stool for forty-eight hours. On the following day there were seven to five rather loose green stools. During the following week the general condition was much improved; the stools were fewer; the turgor was good, and the infant was happy and hungry. Within the next three weeks there was a complete metamorphosis; the improvement was now marked; the baby looked well; had good color; no longer had any diarrhea; developed a good appetite and continued to gain weight regularly. Instead of a ghastly apathetic infant, there was now a bright, healthy looking baby.

Whether or not the recovery of this infant was caused by the surgical interference of the mastoids cannot be determined, for it is also likely that recovery might have followed without operation. The conclusions to be drawn from this case are still questionable, because the mastoid showed lack of inflammatory reaction during operation and postoperatively, and it is difficult to say whether such a small amount of retained pus, even in an infant of this size, could cause such severe systemic reaction.

Mastoiditis in Infants (Abstract). Dr. Arthur M. Alden.

Prior to about two years ago a surgical mastoiditis in an infant was rarely diagnosed except upon the basis of external signs; redness, swelling or subperiosteal abscess. Largely as the result of work done in the St. Louis Children's Hospital and followed up and corroborated elsewhere, we now know that an infant may have a very severe type of mastoid infection, capable of producing profound constitutional symptoms, and even death, without any of the conventional signs of mastoiditis being present.

Routine autopsies on infants who had died as a result of what has hitherto been called cholera infantum, marasmus or intestinal decomposition, have uniformly failed to show causal pathology in the gastrointestinal tract, but almost without exception pronounced infections of the mastoid antra and middle ears were demonstrated.

Mastoiditis in adults has been classified from a pathological standpoint into two types, coalescent and hemorrhagic. In the former, the local spread of the infection is by direct contiguity and the symptoms are, for the most part, the results of pressure. In the latter, the dissemination of the infective agent takes place by way of the local blood or lymph channels and the symptoms are the result of massive and profound toxic absorption. Each of these types of mastoiditis in the adult has its analogue in the infant. The first type includes the hitherto accepted classic form of mastoiditis with its local swelling, redness and subperiosteal abscess. The diagnosis in this type of the disease presents no difficulty and is often made by the parent. In the other type of the infection, which in the infant we have called the noncoalescent type of mastoiditis, external signs are as a rule absent and the predominating symptoms are fever, diarrhea and vomiting, which are the results of septic absorption from the infected ears. The diagnosis as to the true cause of this gastrointestinal syndrome is

often missed because the ears of these cases are not carefully examined. The otologic signs in this latter type are change in color and lustre of the eardrum to a dirty gray or yellowish appearance. Redness and bulging may or may not be present. A sag in the superior wall of the canal external to the drum is pathognomonic of this condition. Such drums should always be incised and incision is usually followed by a prompt remission of the intestinal symptoms.

The pediatric treatment of this type of case is very important and consists of supportive therapy in the nature of fluids, Ringer's solution and transfusions, usually administered directly into the superior longitudinal sinus. Only when in spite of adequate drainage through the eardrums and all supportive measures, the condition of the child as shown by the weight and fever curves becomes progressively worse, do we feel that external drainage of the mastoid antrum must be done. Earlier in our work, we were reluctant to operate upon these babies until they were almost moribund, and many of our early fatalities could, I am sure, have been prevented had they been operated earlier in the course of the disease. When it is determined that mastoid antrotomy is indicated, the sooner that it is done, the better will be the prognosis for the little patient, because these babies often pass from a very fair to an almost dying condition in a few hours.

In our hands, all the operations have been carried out under local anesthesia. For this purpose, 0.5 per cent novocain, with 10 drops of 1-1,000 adrenalin to the ounce, has been used, with very satisfactory results. The skin over the mastoid and the periosteum covering the mastoid antrum is thoroughly infiltrated. The incision required is usually $1\frac{1}{2}$ to 2 c.m. in length. The only landmark which it is necessary to see is the posteriorsuperior margin of the external auditory canal or the posteriorsuperior margin of the annulus. The infantile mastoid antrum lies just behind and above this point. After the periosteum is elevated, the cortex is removed by a rotary motion of an 8 m.m. Alexander gouge. This usually completely unroofs the tiny mastoid antrum. All overhanging edges are removed with forceps and the granulations gently wiped or curetted from the mastoid cell. The curette should never be passed forward into the aditus or attic on account of the danger of tearing or displacing the ossicular attachments. When the operation is finished, the antrum is lightly packed with a gauze drain and no attempt at surgical closure of the edges of the incision made.

The first dressing is usually changed on the second day after operation and from that time until the wounds are healed, daily dressings should be the rule. Sterile dressing technic is very important, because in those cases which become secondarily infected, the convalescence is as a rule prolonged and stormy. The gauze drain should be kept in place until inspection of the ear shows the tympanic membrane to be closed or the perforation, if patent, dry. In those cases which show an obstructive mass of adenoids or a nasopharyngitis which does not yield readily to treatment, an adenoidectomy performed before the child leaves the hospital, will probably help to prevent recurrence.

In two-and-one-half years' experience with these cases we have learned many things. At first, cases were operated upon only when disaster threatened. Of the first seventeen cases which came to operation, we were able to save nine. Realizing that some of the cases which died could probably have been saved had they been operated earlier, we became somewhat bolder and of the next nine cases, only three died. In the next series of forty cases, we saved all but five, two dying of pneumonia, one of meningitis, one of athrepsia, and one of septicemia.

Lantern slide demonstration of cases, temperature and weight charts and technic of the operative procedure.

DISCUSSION.

PROF. PORTMAN: I have greatly enjoyed this splendid paper, but cannot express surprise. At home and in the case in my practice, I have the same experience. I think it is the result of co-operation between the otologist and the pediatricist. A professor of Paris gives a large mass of statistics of these children and of many cases of diarrhea produced by trouble in the ear; and in those cases where there is a definite ear trouble I have sent the patient

to a pediatricist for a careful examination. I am confident there is an actual relation between the two conditions.

DR. WALTER LESTER CARR: It has been a privilege to hear the contribution from Dr. Alden and from his special paper we have learned many facts relating to general medicine. In my experience at the Eye and Ear Infirmary, I have not known of delay in doing mastoid operations in children. Usually I see the children after operation if there is a complication. During this winter, there were a number of children with pyelitis of the colon type of infection. The history previous to the mastoid operation was not always complete, because the children were brought in from the out-patient department, sometimes without any record; but in some children intestinal disturbance and the loss in nutrition showed that there had been a systemic infection. Acute gastroenteric symptoms, such as were described by the author, are not so common.

In the pediatric service at the city hospital, I have prohibited the term *marasmus* in making a diagnosis of malnutrition from any cause, for that has led to misstatements, as it is a term which is not complete and is confusing. Children admitted are examined for nutrition, intestinal factors, heart, kidneys, lungs, throat and ears. This year we have had malnourished children who have had a mild influenza with a pyelitis as a complication. At the infirmary pyelitis has followed operations, whereas at the city hospital the cases have been associated with the onset of influenza. This year most of the children with mastoid disease have had the *streptococcus hemolyticus* type of infection and a lesser number the *pneumococcus*. With reference to the *pneumococcus* group, operation on the mastoid in a child with a *pneumococcus pneumonia* I believe we can allow, as the disease is a self-limited one, with comparatively low mortality, and the operation can be done, if necessary, under local anesthesia. Such children have been operated upon during the height of pneumonia without any increase in the pneumonic process. The observations on these children must be made by the pediatricist and the otologist. Examinations of the mastoid by the X-ray have been of value in many children, although not all we hoped for.

The cases reported this evening, previous to the reading of the paper, were of the same classification. Children with nutritional defects and mastoid disease may have a comparatively low temperature, followed after operation by high temperature, and have a B-colon infection, bronchopneumonia, lymph node infections, etc. Blood examinations before operation are important, as these children show a progressive loss in their color index, in addition to gastrointestinal symptoms. Not only will proper feeding be indicated, but fluids in full quantities will be required and blood transfusions may be needed before operation in the children whose illness has been associated with protracted intestinal symptoms.

DR. M. J. GOTTLIEB: I would like to know whether, given a case of diarrhea and vomiting of the type described, with no ear manifestations whatever—no redness or bulging, no obliteration of the landmarks—but a discharge of mucus from one of the Eustachian tubes—would that be an indication that the drum should be opened on that side?

Another question is, Has Dr. Alden observed in any of these children a nystagmus? I ask that, because of an experience that we had at the Greenpoint Hospital lately, a child with no mastoid symptoms, who was very sick with a discharging ear, and a nystagmus to the opposite side; there was a definite defect in the drum due to an attempted incision of the drum membrane before the child was admitted. It had a definitely diseased mastoid on that side, but there were no external signs of a mastoiditis; it had a nystagmus on the opposite side, and also had an increase of cells in the cerebrospinal fluid; it also had a discharge from the Eustachian tube from the same side, but not on the other side, and the mastoid on the other side did not show any evidence of disease.

I wish to congratulate Dr. Alden, for he has done splendid work, and it has been inspiring to listen to him. I would also like to congratulate Dr. Welt on his splendid presentation in a case where there was no visible involvement in either the mastoid or the drum membrane before the autopsy.

DR. BLACKWELL said that he felt that we must think of the general condition and try to reason from cause to effect when considering the trouble and the necessity for operation in these children. He could not help feeling that in

the majority of instances that the rundown condition of the patient was responsible for the aural infection, and not the other way about. We should not place too much significance upon slight changes in the appearance of the drum membrane in a crying, vomiting infant, as retching and expiratory blasts will in themselves cause congestion in the drumhead and bulging. By incising such a membrana tympani we not only do not help the patient but place him in jeopardy of developing an infection while in this rundown condition. Personally, he did not feel as though he would be justified in operating upon some of the cases as early as Dr. Alden has. As regards the so-called latent mastoiditis, he felt that there were usually some symptoms present which renders the condition obvious to the trained otologist. He felt that there should be closer contact between the pediatricist and the otologist and that the solution of the problem lies along these lines.

DR. J. M. LORE: I learned my lesson at the autopsy table. It was in such cases as Dr. Alden speaks of, that upon dying, an autopsy was performed, in which it was found that one or both mastoids were diseased and in which nothing in the intestinal tract was found to account for the gastrointestinal symptoms. It may be of interest to state that in several cases the mastoid was found to be infected by the organisms of Vincent's angina. We had six cases in all, of which five were probably secondarily infected. The other case was a primary Vincent's infection, because on performing a myringotomy the pus which came out was very dark red and foul and contained both fusiform bacilli and spirillae. This last case also showed spirillae in the adenoid, which was removed. In these cases we were using a weak solution of formaldehyde.

DR. SOLOMON HORWITT: There has been a good deal of skepticism with regard to Dr. Alden's work. It is therefore reassuring to learn that Dr. Alden insists that in addition to the gastrointestinal trouble there must be local otological indications. Naturally, there can be no objection to mastoidectomy in the presence of local indications.

The skepticism alluded to arises from the fact that there is no parallelism between the two conditions; for whereas the incidence of alimentary intoxication is highest in the summer months, upper respiratory infections reach their level in the winter. Another point: the association of some alimentary disturbance with middle ear suppuration had been known for many years past and was variously designated as otitis media concomitant or otitis media cachecticorum, implying thereby that the ear condition was considered secondary and of trivial importance. Did the older pathologists err or, to use a colloquialism, did they put the cart before the horse? Time will show.

DR. A. M. ALDEN: In closing, I wish to thank all of the gentlemen who have so kindly discussed this presentation. We started doing this work in the fall of 1924. In the following spring, the chief of the St. Louis Children's Hospital said to me, "Where are you going this summer?" I replied, "I am not going away because I am anxious to stay here and see if our cases of summer diarrhea have ear infections." We had that year our usual number of babies with typical summer diarrhea and I examined every one of them repeatedly and found nothing to indicate that these cases had middle ear infection.

Someone asked what I would do with a case of diarrhea in an infant who on repeated and careful ear examinations showed nothing wrong with the ears. I would do nothing as far as the ears were concerned. Every case of ear infection shows certain definite otologic findings, and any intervention must be based upon such findings, otherwise we are not practicing good otology.

When this work was first presented two years ago, it was received more or less critically by both the otologic and pediatric professions. It was said to be radical, not based on good otology, and that it would probably lead to a lot of indiscriminate and unwarranted surgery on babies. In answer to this it may be said that a life-saving measure is never radical. As to the second contention, that this work is not based upon good otology, I am sure that you will all agree that I have said nothing tonight that contradicts any of the time-honored precepts of our otologic forefathers. I have laid down fairly definite indications for the treatment of these cases, and these indications, if followed should certainly not lead to unnecessary operations being performed on these little patients.

The question as to whether or not the ear infections in these cases were the result rather than the cause of the debilitated condition of the baby, has been discussed pro and con in the literature for some time. Prior to three years ago the former was the most universally accepted opinion and treatment of these cases by feeding and other pediatric measures resulted only in a very high percentage of fatalities. The fact that our method of treatment has reduced the mortality in these cases by more than 75 per cent should answer this question satisfactorily.

To those of you here tonight in whose minds there still rests a question as to the causal relationship which exists between these two often coexisting disease conditions in the same baby, I have only this to say. Ask your pediatrician to let you carefully examine the ears of all of his cases of diarrhea, vomiting, fever and anhydremia, the cause for which he is not able to determine. Better still, get his cases dying of cholera infantum, marasmus, intestinal decomposition or whatever he may choose to call it, and follow these cases to the autopsy room. Examine the gastrointestinal tract and then carefully open and culture the middle ears and mastoids. If you do this, you can soon see for yourself whether or not our contentions are based upon good ground.

In conclusion, I wish once more to emphasize the fact that the conduct of these cases belongs neither to the pediatricist nor the otologist alone, but success in this field of endeavor depends upon an understanding and tireless co-operation between the two specialties. When the pediatrician recognizes the intimate relationship that often exists between streptococcus infections of the upper respiratory tract and gastrointestinal disease in an infant and when the otologist learns how to handle these infections promptly and without shock to the little patient, co-operation between these two will certainly result in another material contribution to the reduction in infant mortality.

Anomalous Development of Sphenoid. Dr. Julius I. Klepper.

(To appear in a subsequent issue of THE LARYNGOSCOPE.)

Necrosis of Antrum and Ethmoid in Baby Three Weeks Old; Operation.
Dr. I. W. Voorhees.

When the baby came in he had an enormously swollen right face with a swollen eye and, relatively speaking, this side of the face was twice the size of the left. In stroking the nose, pus came from the right nostril. There was a fistula in the mouth from the point where the first molar would be if the child had a molar, and pus was coming down from the fistula. X-ray pictures were made, and a Wassermann ordered, but it was not done. The case was brought into the hospital immediately, a mild general anesthesia was used, and the ordinary incision made. As soon as we got in through the soft tissue, we dropped immediately into a pus pocket and there seemed to be necrosis of the entire superior maxilla. It was impossible to differentiate between the antrum and ethmoid or anything else. It was simply a question of curetting out what we had to deal with, and incidentally the tooth "buds" all came out with the curette. The material that came out was necrotic, and not very different from what one sees in a cold abscess. An opening was made beneath the inferior turbinate, and the antrum was packed with narrow strip gauze. The child remained in the hospital about a week and then went home. The family physician packed the nose for some little time. Three weeks later I saw the child, and the wound had closed completely, so that there was no fistula, and the child is now quite normal.

DISCUSSION.

DR. J. D. WHITHAM: I believe that almost every case of fulminating sinusitis in children is due to syphilis. I am not sure about Dr. Voorhees' case; apparently here we have an exception, but almost all the cases I have seen of fulminating sinusitis in little children have had a syphilitic background. I had a recent case of a 7-year-old child with an orbital abscess which came on suddenly. I made the usual external ethmoid incision and did not locate the pus. A week later I was getting ready to explore the pus in the outer portion of the orbit. When I put the eye speculum in to see the condition of the conjunctiva, etc., the abscess ruptured into the conjunctival sac. I probed it and found that the pus had burrowed through the roof of the antrum into the

orbit. The Wassermann was positive. I have had two other cases of simultaneous abscess in both orbits from a sinusitis coming on very suddenly in children. Both of them have had four-plus Wassermans. So my experience has led me to believe that almost all cases of fulminating sinusitis in little children have a syphilitic background.

Radical Killian; Local Anesthesia. Dr. I. W. Voorhees.

This man had one tuberculous kidney removed three or four years ago in the Presbyterian Hospital. He had had a bad sinusitis for several years and a great many polyps had been removed from his nose in several institutions. We had done some intranasal work in our clinic. The ethmoids had been pretty well cleaned out, but still he had a great deal of frontal pain, and the only thing left to do was a frontal sinus operation. In the light of only one kidney being present, we took him into the hospital for a week for examinations of blood and urine to find out how he was eliminating. We found he was not eliminating well enough to stand a general anesthesia. Therefore, I did him under novocain, 1 per cent, injecting in the supraorbital area and around the eye. The incision was not carried down on the nose, so we did just the ordinary frontal operation. It was a very simple thing to do. We got into the naso-frontal duct, made a good opening, and the skin was closed by subcuticular suture. He did not have any pain during the operation. The simplicity of this procedure made me feel like repeating it in other cases where general anesthesia seems, for any reason, to be undesirable.

DISCUSSION.

DR. JULIUS I. KLEPPER: A case was reported by me last year in May of osteomyelitis of the head, where all operations (six) were done under local anesthesia; Dr. Nilsen remembers this case. Local anesthesia works very well in a not too nervous patient, in a strong patient, and in a weak patient as a matter of necessity, as was in our case mentioned.

Bullet Wound of Antrum and Sphenoid. Dr. J. D. Whitham.

A. S., male, age 34 years. For the past seven years this patient has had considerable trouble with his sinuses, having been treated for a suppuration of both antrums at various times. The treatment which he has received for this trouble has never helped him very much for he has always had a large amount of discharge from both sides of his nose. On Aug. 1, 1926, he was shot in the face in the doorway of his own home by an unknown highwayman. He was taken at once to the Beekman Street Hospital and stayed there until Aug. 12. While there no operation was undertaken, but the wound was washed out frequently with boric acid solution. He left the hospital of his own accord and came to my office for advice on Aug. 18.

On examination on that date he showed a large fistula in the right infra-orbital region, which was discharging tremendous quantities of pus, necessitating the change of dressings every few minutes. On palpation it was obvious that there was a considerable loss of bone in the outer wall of the right antrum and that the infraorbital nerve had been severely injured, or cut, by the bullet. No wound of exit could be found. A tremendous amount of foul-smelling pus was constantly exuding from the middle meatus on the right side and a considerable quantity from the middle meatus on the left side. Transillumination showed both antrums dark. A solution of mercurochrome was injected through the fistula and it was noted that the discharge in the nose and in the throat was stained.

An examination of X-ray films taken on Aug. 17 shows the presence of four large fragments of a bullet on the right side of the face. Fragment No. 1 in the right sphenoid; No. 2 in the posterior wall of the antrum; No. 3 in the pterygomaxillary fossa; and No. 4 in the anterior wall of the antrum. Both antrums, ethmoids and frontal sinuses were cloudy. There was also evidence of comminution of the antral wall.

On Aug. 20, 1926, I operated at the New York Eye and Ear Infirmary under ether and did a rather extensive Caldwell-Luc operation. The outer wall of the antrum consisted largely of necrosing fragments of bone and the mucous membrane was greatly thickened and polypoid. The fragment marked No. 4

on the X-ray film was found imbedded in the bone of the anterior portion of the antrum, and the fragment marked No. 2 was found in the posterior portion of the antrum. These were removed. The nasoastral wall was comminuted and the greater portion of it was removed. This was also the case with the orbital plate of the ethmoid and a portion of the floor of the orbit. The ethmoid cells were exenterated through the antrum and a careful search made in the sphenothmoidal region for bullet No. 1 without success. The antral cavity was thoroughly curetted, one strip of iodoform gauze was packed therein and the buccal wound was closed with interrupted stitches of dermol. On the third day following the operation the patient suddenly developed a swelling of the throat above the right tonsil which closely resembled a peritonsillar abscess. He had fever and suffered a great deal of pain for four or five days. This region was opened and an attempt made to locate bullet No. 3, which apparently lay in the pterygomaxillary fossa. A few drops of pus were evacuated but the bullet was not found. Following this he made an uneventful recovery and after ten days the washing from the right antrum was clear and has remained clear ever since.

An examination of an X-ray taken after operation shows the presence of two bullet fragments, one in the sphenoid sinus and the other in the pterygomaxillary region, i.e., No. 1 and No. 3. Two attempts have since been made through the intranasal route to remove the fragment from the sphenoid, without success. The fragment seems to lie in the anterior sphenoidal wall and to be wedged in the bone of the posterior portion of the nasal septum. It can be touched with a probe but, in the presence of possible and unknown lines of fracture, it is not considered advisable to pursue any further attempts or to use much force. The left antrum was apparently infected prior to the receipt of the wound and has been irrigated and treated in various ways without much success. On April 27, 1927, a Caldwell-Luc operation was done on that antrum under ether. The mucosa lining the antrum was polypoid and complete recovery followed the operation.

The wound was made by a .32 calibre pistol bullet, which apparently entered at the exact site of the infraorbital foramen and broke into four main fragments, one fragment lodging in the sphenoid sinus, two in the antrum, and the fourth in the pterygomaxillary fossa. The antrum being infected prior to the injury and the bones being comminuted, a nasty mess developed at once. The patient being free from suppuration and other symptoms at the present time, it is not considered advisable to attempt removal of the fragment which remains in the sphenoid or the fragment which is still present in the pterygomaxillary region.

A case of multiple angiomas in a young woman was also demonstrated, in order to obtain suggestions for the best method of treatment.

DISCUSSION.

DR. W. W. CARTER: It seems to me in the case of multiple angiomas it would be inadvisable to do any kind of surgery, because the chances are that we would have a great deal of difficulty from hemorrhage, and I doubt seriously whether any great amount of good would be done, because this girl has a tendency to the development of these angiomas in other parts of the body than her tongue. I noticed that she had one near the tip which is just beginning to develop, and then one on her thumb that has come on very recently. It would seem to me that it would be a good plan to use some kind of coagulatory method of treatment, and of course great caution would have to be taken that the clots from the coagulation were not dispersed into the general circulation, which could be very easily done, because these angiomas can be made to disappear by very slight pressure. Either electrocoagulation or coagulation by means of some chemical substance would be my suggestion as to treatment in this case.

DR. MARVIN FISHER JONES: I do not see how coagulation treatment would have much effect on the hemangiomas. As I understand it, this is a condition of the vessel wall, a discrepancy in the vessel wall itself with proliferation of the blood vessels. I do not understand what effect coagulation of the blood would have on the growth.

DR. CARTER: I would like to make the point that if you produce complete coagulation in these tumors, that they become organized; that was my idea

about it, and while of course we know that angiomas are due to dilatation of the vessel, I am quite sure that if any kind of surgical procedure were used, there would be a great deal of hemorrhage. In this case there seems to be a tendency to the development of these tumors in various parts of the body; this would suggest that surgical methods are contraindicated.

DR. JONES: My experience with hemangiomas is not very large, but I have thought of one or two things as possibilities. I would like to have Dr. Robinson enter into the discussion and discuss the effect of radium as it is used sometimes in these small hemangiomas.

DR. JOHN E. WELCH: If I am not mistaken, Dr. Huey some time ago showed a case of hemangioma of the pharyngeal wall before this Section which after removal returned some years later as large as the original condition. He contemplated some kind of destruction by radium or X-ray.

DR. G. ALLEN ROBINSON: In children the lining of these capillaries and small vessels is very sensitive to radium treatment, and the result is fibrosis and obliteration of the vessels. In the adult the vessels become so organized, and particularly in large ones, that the endothelial cells may become obliterated, but the space is still there after treatment unless caustic doses are given, thereby producing a slough. In this case a good result could be accomplished by electrocoagulation. On the other hand, it is accessible for surgical removal; it is a papillary type, and I think can be easily removed. In that case it might be well to follow it up with radium after the large lesion is removed. The smaller lesion can undoubtedly be treated with radium. The cause of this tumor, it seems to me, is due to the irregular upper teeth, which are so out of alignment that when the tongue comes forward there is a trauma. Possibly it started as a small blood blister, which has been constantly irritated and in that way has given rise to this large tumor. I saw a case recently of an hereditary telangiectasis of the septum made up of minute blood vessels. The patient, a girl age 20 years, suffered from several nose bleeds daily. She was weak and anemic. Here the blood vessels were small and reduced to fibrosis by radium treatment without any damage to the normal tissue.

DR. LEON T. LEWALD: I reported a case with Dr. Huey which was presented here a few months ago. Dr. Huey told me that he had successfully removed the growth by electrocoagulation. It was an hemangioma of the pharynx, fully $2\frac{1}{2}$ inches long and $1\frac{1}{2}$ inches in diameter. Dr. Huey had no great difficulty with it, and succeeded in removing it all at one sitting, and told me about a month later there was apparently no recurrence. It had recurred once before after radium had been used on it, so that this time he endeavored to remove all parts of the hemangioma, being particularly careful to get the base by electrocoagulation, and succeeded in doing so.

DR. WHITHAM (closing the discussion.): I think that the large growth on the tip of the tongue may be removed very easily, either by electrocoagulation or surgical excision. I had planned to remove it simply by the surgical method of putting a clamp at the base and excising it and cauterizing around the clamp, like a hemorrhoid operation. I think it would be a very simple thing to do. As far as fearing to operate on a tumor of the tongue is concerned, I do not see any reason for it. If you have bleeding, all you have to do is to ligate the lingular artery and the bleeding stops. There is nothing to fear about it.

A Case of Pneumocranium Due to Fracture Through the Frontal Sinus.

Dr. William Wesley Carter.

This man, age 35 years, was brought to Gouverneur Hospital in the ambulance on March 4, 1927, and admitted to my service, with the diagnosis of fracture of the skull.

His past personal and family history are unimportant.

He received his present injury when he fell down a flight of stairs and landed on his head.

Examination showed a well built man with an alcoholic breath, semiconscious and bleeding profusely from the nose and mouth and from extensive lacerations over the forehead. One of these extended over the left frontal region, beginning $1\frac{1}{2}$ c.m. above the inner canthus of the left eye, and extending upward and to the left 6 c.m. Another small laceration extended above the right

supraorbital notch for about 2 cm. The palpebrae of both eyes were ecchymosed and so swollen that the pupils could not be examined at this time.

On admission pulse was 88, respiration 20 (no stertor) and temperature 99°. At no time during the progress of the case was there any marked deviation from this normal standard.

Neurological examination was negative.

By *palpation* it was discovered that both nasal bones were fractured and that there was an irregular oval-shaped plate of bone $3\frac{1}{2}$ c.m. wide by 6 c.m. long, completely detached from the left frontal bone and raised fully one-eighth of an inch above the general level of this bone. Apparently this was due to pressure from within the skull. There was some subcutaneous emphysema near the lower end of the left laceration.

Drains were inserted at the lower extremity of each of the wounds, and the lacerations were closed with silkworm gut. Cold compresses were applied to the eyes and the case treated expectantly.

A lateral view X-ray was taken within four hours after admission. This showed a comminuted fracture of the nose and of the left frontal bone, involving the sinus and with a crack extending down through the nasofrontal duct. *No air pockets appeared in this plate.* An anteroposterior view was not taken at this time, as the patient could not be safely moved around.

There were no symptoms indicating the advisability of making a spinal puncture, so this was not done.

The patient's mental condition cleared up the second day after admission to the hospital, and the entire course of the case was one of uninterrupted recovery. The wound healed promptly and the emphysema noted at first disappeared.

So far as subjective symptoms are concerned, the patient showed no signs whatever of the interesting condition which subsequent X-ray plates disclosed and which I now relate:

Twelve days after the first X-ray, which showed no air whatever in the skull, other X-ray exposures, both anterior and lateral, were made; these showed two air pockets within the skull in the cerebrofrontal area. The upper pocket was quite large and the smaller pocket was in close contact with it, but appeared distinctly separated by a very thin partition. Five days later these pockets were larger, and repeated X-ray examinations showed that they increased in size and finally coalesced into one large pocket twenty days after the injury. On percussion at this time a tympanic note could be distinctly elicited. From the twentieth day on, the pocket diminished in size until it had completely disappeared, two months after the injury. The man apparently is as well as he ever was.

In this case we believe that the air was forced into the skull through the fracture in the frontal sinus when the man blew his nose. It is remarkable that infection was not introduced, that no meningeal symptoms developed, and that there were no signs of increased intracranial pressure.

Apparently the air pocket was located in the subdural space. It did not communicate with the ventricle and there was probably no laceration of the brain substance.

The rapidity with which the air was absorbed from this area is illuminating and quite unexpected, as was also the prompt recovery of the patient from an apparently fatal injury.

DISCUSSION.

DR. LEON T. LEWALD: This case is of considerable interest from the Roentgen ray standpoint. I quite agree with Dr. Carter that the presence of the air was confined somewhere in the region of the falx and frontal lobe on one side. It is the same distribution of shadows that we see sometimes in calcification of the falx, and I see no reason to think that the air here is in any other location than that. It hardly could have been in the brain itself, although there is a very striking front view, very much like a ventriculogram, but the lateral view disproves that entirely, and the fact that the air does not shift into some other part of the brain in different positions proves that the air is confined and not in the lateral ventricle. I might say that as far as I know from the literature that this is one of the few cases to recover. There was an autopsy done by Dr. Otto Schultze on a case. Dr. Schultze was exceedingly careful to open the

head under water and prove by the bubbling up of the air that the interpretation of the X-ray shadows was correct. In various Roentgen ray journals several other cases have been recorded similar to this.

DR. WELCH: The remarkable thing about these cases of emphysema is that they are not more frequently accompanied by infection. I recall a case of a very emaciated man with a pneumothorax; during coughing and respiration he developed a general subcutaneous emphysema which involved every tissue of the body and extremities, including the scalp and soles of the feet. It made him look like a man weighing three hundred pounds. A most peculiar case came in the clinic, a large man presenting a tumor in the back of his head, which had appeared suddenly. He had blown his nose and felt this tumor simultaneously pop out in the back of his head. It was emphysematous and crepitated on palpation. X-ray showed he had an enormous mastoid and very large thin-walled cells extending to the back of his head. In blowing his nose very hard he had ruptured through the septa of the cells and cortex of the occipital bone; the thing cleared up in a few days without infection.

DR. CARTER: I was in hopes that someone would say something in regard to the rapidity of the absorption of this air, whether it is not unusual for air to be absorbed so quickly. Especially we would not look for it to be absorbed so quickly in a bone space as in the skull. It is extraordinary that it was.

DR. JONES: Could we have Dr. LeWald's opinion as to whether he thinks the air is intradural or extradural, and, if the latter, what are the chances of its escaping through the original entrance?

DR. LEWALD: That is an interesting problem. My impression is that the air was confined between the falx and the pia arachnoid, and I would be inclined to think the air was absorbed. Air can be absorbed. During some experiments on dogs artificial pneumoperitoneum was produced. We were struck with the rather long time that air was retained in the peritoneal cavity, between two and three weeks. Carbon dioxide was absorbed within a few hours, so that through these investigations we know that air can be absorbed within closed cavities of the body through the circulation, and yet it may remain there for a long time. I have seen a spontaneous pneumothorax that resisted absorption for many months. I believe in Dr. Carter's case the air was in the subdural or intradural space, that is, in the arachnoid space, and that it displaced the frontal lobe and was finally absorbed.

DR. CARTER (closing the discussion): You noted that the outside wound closed up very promptly, and that the slight emphysema down in the corner of his eye disappeared in three or four days after he was injured. The wound united by first intention. There was no infection at all. I showed the case at another medical society, where it was very freely discussed. There was present an expert radiographer, who agreed with Dr. LeWald that the air was between the frontal lobes. He did not think it was extradural at all. The plates show very clearly that it was inside the skull. I am quite sure that the air did not escape through the wound, but that it was absorbed; this disposition of it is shown by its gradual disappearance, as noted in the serial X-ray plates.

SECTION ON LARYNGOLOGY.

May 25, 1927.

The Advisability of Including the Plica Triangularis in Tonsil Removal (Lantern slides). Dr. Robert H. Fowler.

The operation of tonsil enucleation has been standardized to a high degree, not only because it is performed more often than any other, its comparative frequency giving an opportunity for study, but also on account of the anatomical arrangements by which nature has fashioned the organ as a fibrous cocoon containing a chrysalis of lymphoid tissue. This fibrous pocket, or pseudo-capsule, and its complex lymphoid lining can be dissected from its bed of muscle in the side of the throat in a clean-cut manner which resembles the removal of a cyst. An incomplete cyst (where it is exposed to the throat), to be sure, and bilobular in structure, but offering in the so-called capsule a surface that is

definite and true in every case, and a plane of dissection that is recognized as correct. But although it may be truly said that everyone intends to remove the tonsil, the whole tonsil and nothing but the tonsil, and though all agree on the plane of dissection being that which will leave a single layer of fibrous tissue covering the surface of the tonsil in a thin sheath, and leaving the tonsil fossa with a layer of pharyngeal fascia intact, it cannot be said that the operation as a whole is complete standardized as regards the amount of tissue removed in the neighborhood of the lower pole.

There is perhaps no part of the technic of tonsillectomy on which authorities differ more than on the matter I am bringing to your attention tonight. Some deliberately remove all the mucous membrane covering the plica triangularis to the very edge of the palatoglossus; others save this mucous membrane with the most meticulous care. This matter is not without its importance.

The first slide, made from my own sketch of a throat before operation, shows evidences of chronic streptococcus infection limited to the tonsil itself, not involving mucous membrane of the lateral pharyngeal wall nor the plica triangularis.

This slide, drawn by Feinberg two weeks after complete removal of the tonsils, in which operation the mucous membrane of the plica triangularis was left in place, shows similar type of infection appearing in and limited to this area of the mucous membrane. Under these circumstances it was thought best to remove the infected mucous membrane, and the patient's recovery was then complete. I assumed that it contained lymphoid material which had been infected from draining the tonsil, but when I showed these pictures to Ralph Fisher, of Cleveland, he said, "Why did you remove it; why not leave it for a time and see whether the tissue could not rid itself of that infection?"

In the next few slides I will try to show the technique that Ralph Fisher himself follows, and give his view of the matter based on the removal of the whole tonsil, and *nothing but the tonsil*.

Dissecting the lower lobe. This picture shows the lower part of the plica triangularis in the form of a sling.

In Ralph Fisher's operation on the one hand and Just Matthews' on the other, we find then the extremes of leaving all the mucous membrane covering the plica triangularis, with the idea of giving the best cosmetic result and removing the whole of the membrane covering the plica so as to be sure to get all the lymphoid tissue, not only the tonsil itself, but all the infratonsillar nodules. The next two slides will show the right side of the throat as seen in the dissecting room.

This shows the muscle of the anterior pillar, the palatoglossus, pulled taut by hook and chain on the uvula, the plica triangularis covering the anterior surface of the tonsil where it emerges from under the muscle. The plica triangularis is described by George Fetterolf as being essentially that portion of the capsule which projects beyond the free border of the palatoglossus. It is covered by a thin layer of mucous membrane, continuous with the similar layer of buccal mucosa and continuous with the mucous membrane covering the tongue.

The next drawing shows a dissection of the tonsil in the cadaver. Upper lobe held with hook and chain, showing the capsule which forms a hood over it. The lower lobe under the hook presents solid lymphoid mass. Correct dissection of the capsule has here been made and the outer sheet of areolar tissue covering the surrounding muscles has been dissected in such a manner that its edge can be seen. The mucous membrane held in forceps is being stripped from the anterior pillar and plica triangularis, and it is noticeable that the lymphoid tissue in its lower part shows definite masses, the so-called infratonsillar nodules.

The next picture will show this same thing drawn in a living subject, showing the relation of the infratonsillar nodules limited to the lower third of the plica triangularis, and in the remaining three pictures are shown a method of dissection which saves the upper two-thirds of this membrane and sacrifices the lower third, which is the portion in which these nodules lie.

If a snare is used it is placed after the dissection has been carried to the very base of the tongue. The first drawing on this slide shows the tonsil entirely free from being lifted so that the snare can include the infratonsillar nodules

and the lower third of the plica triangularis, together with the lower pole. The lower drawing shows the technic of removing these infratonsillar nodules in case the sharp dissection has been used without snare for the removal of the tonsil.

In favor of leaving the plica mucous membrane in place it is claimed: 1. That in singers this does much to prevent any change in the voice. The scar following tonsil operation is less, and the pillar muscles are not bound to each other. 2. The cosmetic result is better and the throat heals more rapidly, with less pain and discomfort to the patient.

In favor of removing the whole plica triangularis with its mucous membrane, it is claimed: 1. That this prevents small points of infection being overlooked, which cause cervical adenitis. 2. That incision along the edge of the palatoglossus muscle affords the quickest and easiest approach to the capsule, and thus makes the operation faster and easier to perform.

Conclusion: The upper two-thirds of the mucous membrane of the plica triangularis may be left attached to the anterior pillar, and the lower third with the infratonsillar nodules removed with a snare, thus gaining the advantages that are claimed for each of the more extreme measures. The astute surgeon will find an opportunity to use his judgment in each individual case, keeping in mind that though the infratonsillar nodules are not strictly part of the tonsil itself, they form part of Waldeyer's ring, and if left in the throat occasionally give trouble; keeping in mind also that the preservation of as much mucous membrane as possible will give the best cosmetic result, will preserve the quality of the voice and will lessen the tendency of scars attaching to the base of the tongue.

DISCUSSION.

DR. JULIUS I. KLEPPER: Our method of operating is to incise the plica triangularis first, all around the median wall of the tonsil, removing any excessive plica triangularis that may be there; this is most prominent at the lower pole of the tonsil. We do object to calling the plica alone, the capsule; there is no real capsule. When you incise the plica you get into areolar tissue which binds the tonsils to the surrounding parts of the fossa; the same can be seen very well if these areolar tissues had not undergone too much fibrosis, as would occur in very bad tonsils after several peritonsillar abscesses.

The so-called capsule therefore would include the plica triangularis, the areolar tissue, and the fascia covering the superior constrictor muscle, therefore more of a limiting membrane.

DR. A. LOBELL: I had the pleasure of watching Dr. Fowler doing this interesting work. He should be highly commended on the excellent results which he had obtained. I had the opportunity of seeing a large number of cases operated upon in this painstaking and meticulous manner. It is really a remarkable improvement on the older methods. One is apt to think that we have already accomplished everything pertaining to the technic of tonsillectomy until one strikes here and there a patient who presents a very peculiar scar formation. This cannot be explained by faulty technic, because the operation is always performed the same way in all cases. It must be due to some other factors. It is worth while to remember that there are still many little things not thoroughly understood in the realm of tonsil surgery.

I hoped that Dr. Fowler would say something about that tiny muscle around the capsule, called the tonsillopharyngeus muscle. He has shown that saving this muscle is an additional valuable means of preventing ugly and tight scar tissue formation.

DR. CARTER: I wish to express my appreciation of Dr. Fowler's excellent paper, which I enjoyed very much. I agree with him that it is not very important about the infratonsillar nodules. They consist of tonsillar tissue, but they are never covered over by the pillars, and drainage of secretion from them is always very free, so I do not believe that very much trouble comes from them. I do not see any need for taking extraordinary precautions to remove them. I was in hopes the Doctor would say something about the paratonsillar glands. I have not heard about paratonsillar glands for a long time. I remember on one occasion when the subject was very thoroughly discussed that someone placed a great deal of importance on the paratonsillar glands, claiming that they were

practically the same tissue as the tonsil, and that frequently after the tonsil was removed these glands took on new growth, became enlarged, and it would appear to someone who had not been well acquainted with the operator who removed the tonsils and had known that he was a skillful man, that he had left in part of the tonsils, and that this part had become hypertrophied again. I do not believe I have ever heard of paratonsillar glands since that evening, and, in closing, I would like Dr. Fowler to say something about it, if he knows anything about it.

DR. ROBERT C. HOWARD: It seems to me this question is very important that Dr. Fowler has brought up, and certainly when we remove the plica triangularis we get a great deal more cicatricial contracture and for a time the patient will complain of soreness in the throat, and tightness. On the other hand, if we leave the plica there, with islands of lymphoid tissue embedded in the mucous membrane, the patient continues to have trouble with his throat. He has a chronic infection there which causes enlargement of the cervical nodes, and it seems to me the only right procedure is to remove this lymphoid tissue. Whether or not it is a part of the tonsil does not matter. It is subject to the same infections as the tonsil proper.

DR. FOWLER (closing the discussion): I feel very much flattered that so much interest and so many favorable remarks have been made about my modest paper. I do not really think that the mucous membrane on the anterior surface of the plica triangularis is so very significant. I believe it is worth while considering it seriously, and we should study it seriously. It can be removed successfully. It can be left in place without any great harm. There are certain points in favor of both these procedures. I have tried to show two operations which make it possible to cover the ground either way, one removing the membrane, and the other leaving it in. Each is very successful, and that shows there is no vast importance to it. I think there are certain cases where we ought to do one and not the other. With singers it is important not to change the voice. There the mucous membrane should be saved at all costs with least scar. In other cases, where the glands are involved, with cervical adenitis, the whole thing should be taken out. If it is left, those glands do not clear up. If you are going to clean up a cervical adenitis you have got to get the whole thing out. I think discrimination on the part of the surgeon is what is needed and a real understanding of the conditions as they are.

In answer to some of the gentlemen, one said that he wondered that I did not speak of the muscle tissue to the lateral side of the tonsil, now being called the tonsillopharyngeus muscle. This is a pet subject of mine, but tonight I am talking about the plica triangularis.

Another gentleman suggested that there is no capsule. He is quite right. I said "pseudo-capsule" in the beginning of my paper, and I said that to be on the safe side. There is no real capsule from the anatomical standpoint, because it is not complete, but it is a capsule when you get through the operation, because you have dissected the tonsil and left it in a sheath. It is an artificial capsule which we create in our operation.

I think I have covered the discussion, and thank you all for listening to me with such patience.

Plastic Cases (Lantern slides). Dr. Gustave Aufricht (by invitation).

In my presentation tonight I wish to point out briefly and emphasize the importance of some details in rhinoplastic surgery.

The practice and science of plastic surgery became well known and the operations and methods are standardized as in any other specialty. Of course, there are different methods for the same purpose, according to the different schools, but the same circumstance is met with in other branches of the medical practice also.

We believe the time has come when plastic operations are no longer a novelty and that we must take up and discuss the details of the technic in order to advance the science.

Our aim is to improve the result, and that the result of the plastic operation should not be merely a change, but the best possible improvement. For this it is necessary to consider the nuances. To take off a large lump, to elevate a sunken nose, or to shorten an extremely long nose certainly means a marked

difference in the appearance of the patient, but the question is whether this was just a change or whether it was the best possible improvement that could be achieved. At this point I wish to lay stress upon the fact that a plastic correction requires artistic as well as surgical skill and that a result should be considered as a work of art.

Besides presenting a few cases, tonight I would like to demonstrate some methods for the correction of the tip and the nostrils. Although this subject may seem of minor importance, from the esthetical point of view it is very important. The rhinoplastic result is good only when every part of the nose will harmonize. The nostrils and tip remaining after a big hump resection are often too large for the new nose, therefore it would not be considered a finished work if the bulbous tip and large nostrils were to remain untouched. I will take the liberty to show the operative methods of these details during the lantern slide demonstration.

DISCUSSION.

DR. CARTER: I would like to discuss the cases of saddle-back deformity. The Doctor spoke of using cartilage altogether. There are some cases that are much better corrected by the use of bone. I still use bone and cartilage, just as I did from the beginning of my work in this field. In 1910, I believe it was, I suggested first the use of conjoined bone and cartilage, that is, taking a transplant from the rib at the point where the bone joins the cartilage, making the upper two-thirds bone and the lower third cartilage in order that the resiliency of the nasal tip may be preserved. I always introduce the transplant through a slit in the vestibule of the nose, and there is no outside scar. The bone is mortised into the frontal bone at the nasofrontal junction, and I get my osteogenesis from the frontal bone. The bone eventually becomes united to the frontal by bony union. The osteogenesis comes from the transplant as well as from the bone. I do not expect to get any osteogenesis from the covering of the frontal bone, as this covering is not a true periosteum. It is merely an aponeurosis. The frontal bone is developed in membrane and has no true periosteum, unless we may speak of the dura as being its periosteum. The use of conjoined bone and cartilage is a great advantage in these cases. In some instances I use only cartilage. The disadvantage of cartilage is that it does not form any bony union with the fixed portion of the nose. It is always movable to a certain extent. It forms only a fibrous union, whereas bone forms an osseous union. Bone when properly transplanted is not absorbed. That I have been able to demonstrate by innumerable X-ray pictures of patients operated on ten or fifteen years ago, and Dr. Law has taken a great many of these plates for me. In some cases of long standing the bone is not only there, but it has grown some. The growth is regulated by the functional demand of the part, and there has been no overgrowth.

The cases of hump nose are rather interesting. I had a very bad case come in from the Saskatchewan district of Canada, about two weeks ago, in which the nose was enormously developed. I had to saw off a very large hump, and the question arose as to how I would do away with the prospect of having a flat nose. I have devised a reamer which works with a little hammer attached to it; so I reamed down the upper edge of the septum, and then I introduced a little intranasal chisel and chiselled the nasal processes of the superior maxillae and bent them in, and I secured a very good result.

DR. KLEPPER: As regards the ozena cases, I think the operations are very good, provided you exclude infectious disease (lues or tuberculosis) or sinus diseases, especially ethmoiditis. I would hesitate to condemn the operations of men like Lauterslager, Hinsberg or Halle—they are good operations and should be tried more.

DR. HERMAN JARECKY: I have been interested in this work and wish to congratulate Dr. Aufrecht on his presentation. I trust that the narrowing of the nose in atrophic rhinitis will have the effect of ameliorating the symptoms. It seems caution will be necessary in dealing with those suffering from ozena, with its accumulating crusts, not to open up avenues of possible infection. However, the subject is of considerable importance, and the report of Dr. Aufrecht's results will be awaited with interest.

THE PACIFIC COAST ACADEMY.

OPHTHALMOLOGY AND OTOLARYNGOLOGY.

March 15, 1927.

The Pacific Coast Academy of Ophthalmology and Otolaryngology was held in Seattle on Tuesday evening, March 15, 1927. The following papers were read and discussed, as well as other clinical matter.

The paper of the evening was read by Dr. Frederick A. Keihle, of Portland, Oregon. It was a very interesting and instructive paper on "The Newer Rhinology". In brief, the subject-matter was:

In the entire realm of medicine, with the startling and epoch-making changes that the past three decades have witnessed, nowhere have conceptions undergone such noticeable modifications as in our consideration of the series of structures lined by the mucosa of the upper respiratory tract. This region, formerly regarded as of relatively minor importance, has become one of prime consideration. It was, before, merely an insignificant anatomical locality. It is now a factor of great moment in the search for causes of disease.

He carefully reviewed the literature on the cases of rhinitis since the beginning of the sixteenth century, giving the various theories and their methods of dealing with their known pathology.

It is common knowledge with most of us that when we graduated we were not aware from our teaching that any surgery could be done in a nose, beyond the snaring of polypi, the removal of spurs or the cauterizing of hypertrophic turbinals.

To what shall we attribute the changed attitude of medicine towards this region? We may, I believe, attribute these changes largely to two factors:

1. The acceptance and elaboration of theories of focal infection which hold that any pus-producing area must be looked upon as a threat against the health of all other tissues of the organism, no matter how far distant; that many types of inflammation can be attributed to the presence of pus, somewhere in the system, and that consequently every possible pus-harboring locale must be eradicated. Now, no recess more intricate or more ideally adapted for the production, storage and concealment of pus could be conceived than our intranasal and accessory structures.

2. The second important feature in the recent evolution of rhinology is the development of intranasal surgery to a high plane. Gone are the days of ruthless clipping and cauterizing of turbinals, crushing operations upon irregular septa, sawing off of bony or cartilaginous spurs, and indiscriminate snaring of nasal polypi, without any attempt to eliminate their source of origin.

Prior to the present era, intranasal surgery had for its sole object the improvement of nasal respiration. Today, while not neglecting this much desired end, we strive for additional objects.

1. Replacement of all structures in as nearly normal relationship as possible.
2. Re-establishment of ventilation of sinus and middle ear cavities.
3. Drainage of infected and suppurating areas.

The newer rhinology looks upon the series of honeycomb caverns of the head as reservoirs, harmless as long as the lining mucosa is normal.

In this regard the antra of Highmore is, in my opinion, of supreme importance, both because of its relatively great capacity and its large natural opening, but particularly by reason of the fact that its duct is located at the highest point of its mesial wall. Hirsch, of the Hajek Clinic, regarded now as a high authority on the accessory sinuses, states that 90 per cent of the infected ethmoids will take care of themselves when once the antra have been cured.

In conclusion, rhinology has come into its own. Regarded for centuries as an adjunct to medicine, a minor and unimportant branch, it has within comparatively a few years, risen to a place of prime importance.

We may well glow with pride that both the improvement in technic in nasal surgery and the inspiration for increased requirements for specializing in this branch have come from within the bounds of our own specialty.

Dr. Pratt, of Minneapolis, was a visitor at the meeting and discussed the paper thoroughly. It was also discussed by Drs. Hyde, Howe, Jones and Harter.

DISCUSSION.

DR. JOHN H. HARTER: Dr. Kiehle's paper has been most interesting and instructive. It was very gratifying to me to hear Dr. Kiehle express his views on infected accessory nasal sinus cases, because they coincide with views gained from my own practice and not observed by me in the literature. We all know there are different cases of both acute and chronic infections in the frontal ethmoidal, or sphenoidal cavities, but in the great majority of cases, with a moderate amount of discharge through the nose, it seems that the maxillary sinus is the chief offender.

It is surprising how many of these cases will clear up when the maxillary sinuses are cured by operation; moreover, this operation leaves the nose in an anatomically normal condition, which is not true after ethmoidal operations.

It seems to me that the prerequisites for safe operation upon the ethmoid are familiarity with the surgical anatomy of the part, gentle touch, good light, local anesthetic to avoid bleeding. If these essentials are observed, there are several different ways of doing ethmoidal operations, any of which will give good and safe results.

Ciliary Body Cyst. Dr. Otto Bell.

The case of Mistress J. K., age 47 years. Three months ago in an automobile wreck. Since then continuous pain in right eye. With her right eye, a month ago she found she could not see her finger when laid on her nose. She had noticed flashings of light at intervals. Two weeks ago the vision of the right eye was markedly reduced.

Examination showed teeth septic, pyorrhea present. Vision: O.D. corrected, 8/10; O. S., 12/10. Myopia present in right eye. Tension U. O. normal O. D. Pupil slightly diagonally oval, sluggish reaction to light and accommodation. O. S. pupil normal. On the O. D. sclera, close to cornea, were three well marked anterior veins said to have appeared in the last two months. The temporal side of the iris was slightly atrophic and had a few pigment granules on it. After dilating the pupil, a brownish spheroidal cyst was seen at the temporal side. The cyst was covered with a degenerated membrane, had no undulations. Evenly distributed pigment covered a system of straight, flat vessels running proximo-distalward. The mass was transilluminated and then continued to show its brown color. There was no fluctuation when the eye moved. Field showed a marked nasal contraction. Blood Wassermann was negative. Differential blood count was negative. Diagnosis suggested was ciliary body cyst, caused by aqueous humor in transit following sudden concussion. On the other hand, this could be a purely degenerative cyst.

Paper was discussed by Drs. Wurdemann, Swift and Kiehle.

DISCUSSION.

DR. CLARENCE W. SHANNON: Have seen only three cases. The first was a sarcoma of the orbit and was found to involve optic nerve, so the nerve was resected with the growth.

The second case was for an angiomatous mass in the orbit. This was removed after considerable hemorrhage, controlled somewhat by electrocautery. The results were very satisfactory.

The third case was more of an exploratory operation. No tumor was found, yet the man died later from tumor of brain.

DR. J. S. DAVIES: We have had two cases during the past two years, in which we did modified Kroenlein operations.

The first was a Japanese lady with a proptosis, with fairly good vision, in which we made a diagnosis of an orbital tumor, and as the eye was in good shape, decided to do a Kroenlein. After having the pathologist report on a frozen section of the tumor was a carcinoma, we did an exenteration. The patient is still alive after two years, but there has been a recurrence during the past year in the antrum and also in the pelvis.

The second case was a patient with quite a pronounced proptosis, with antrum filled with polypi. As the proptosis persisted, after the antrum was thoroughly cleaned out we decided that there must be something in the orbit. At operation we found a bulge of the floor of the orbit, which was causing the proptosis. This was removed and the proptosis has subsided.

Congenital Osseous Occlusion of the Right Posterior Naris. Dr. Francis A. Brugman.

Patient, male, age 25 years. First seen in July, 1926, when he was treated for Vincent's infection of the tonsils and mouth. He gave a history of never having been able to breathe through the right nostril and only slightly through the left. Anterior rhinoscopy showed the right nasal chamber very large, due to a marked deflection of the septum to the left. There was much mucous secretion and the membrane was cyanotic and corrugated. The left nostril was almost entirely occluded by the deflection but the membrane was normal in appearance. Postnasal examination showed the right naris completely closed by a dense pale diaphragm. Left naris was normal. Palate was highly arched and narrow and the teeth were irregular and crowded. There was extensive ulceration of the tonsils and gums. After the acute condition of the gums and tonsils had been relieved, nine teeth extracted and the tonsils removed, the nasal condition was corrected. The dense, bony plate occluding the right choana was removed, working from the base upward, by means of chisels and punches. Deflected septum was resected also. Right choana was packed with gauze for several days and healed without incident. There was some shrinking of the opening in the first few weeks, but none at all for the past six months. At present the opening is not as large as might be desired, but it is ample for free nasal respiration and could easily be enlarged, should the need arise. The patient has improved in general health and gained twenty pounds in weight.

The report was accompanied by a resume of the literature on the subject.

An Acute Exacerbation of a Chronic Frontal Sinusitis with a Subperiosteal Abscess. Dr. J. H. Mathews.

Patient, boy, age 16 years. On Dec. 1 took cold. Acute rhinitis, pain over right eye. Pain increased. On Dec. 10, eye was closed with swelling. This disappeared with hot compresses and some discharge.

The second attack occurred the middle of January, with similar result.

In the latter part of January had third attack and sought medical advice. There was moderate swelling over the right frontal sinus; eye could not be opened. There was a small sinus in upper lid from which yellow mucus was exuded. No fluctuation. Nose filled with polypi bilateral. X-ray showed large right frontal sinus; none on left.

Operation: Polypi removed and anterior ethmoids exenterated. Swelling rapidly disappeared. Patient discharged.

On March 3 and 4, swelling appeared over right eye and patient was admitted to hospital. Operation (Killian). Patient made a speedy and uneventful recovery.

The Dilation of an Esophageal Stricture Through the Bronchoscope. Dr. Manford R. Waltz.

Patient, boy, age 6 years. Had frequent dilations during the last four years. Also had gastrostomy performed. At first dilations were weekly, beginning with 25 French. Now using a 50 French, with no intervals between dilations. No anesthetic was used.

